ELECTRICAL REVIEW

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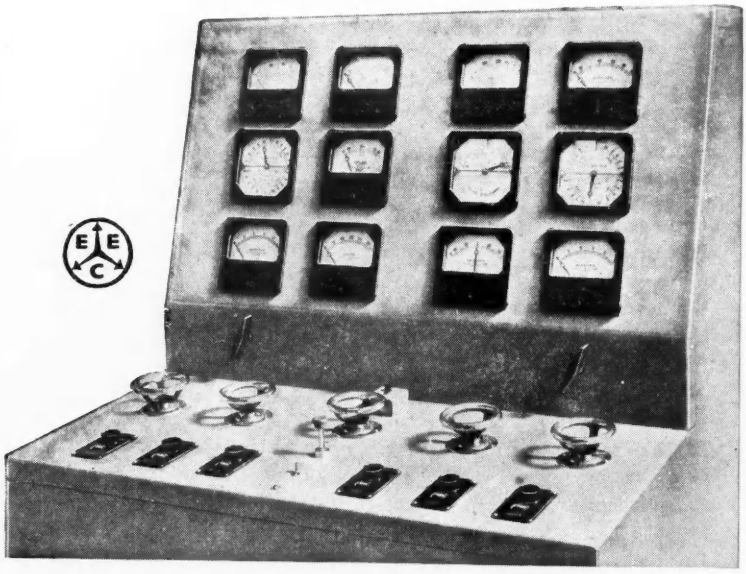
Instruments ...



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ELECTRICAL REVIEW

VOL. CXLIX No. 3845 3RD AUGUST, 1951

THE OLDEST ELECTRICAL PAPER • ESTABLISHED 1872

Interpreting the Facts

NO REASON FOR PUBLIC MISAPPREHENSION

NO charge of keeping the public in the dark could be sustained against the British Electricity Authority. Indeed, its representatives seem to lose no opportunity of explaining the workings of the electricity supply industry, especially in relation to the present power cuts, to a public that is the more sensitive to the effects of these because it formerly enjoyed a more reliable supply than was available in any other country.

Information Easily Obtainable

Any further information we have found to be readily obtainable on request. Electrical measurements being easy, the accuracy of figures supplied is not open to question.

Yet reports and comments on electrical subjects in the lay Press are so often wide of the mark that, assuming the authors to have acquainted themselves with the facts, they reveal the great difficulty they find in interpreting those facts. Conversations with otherwise well informed non-electrical people indicate a similar difficulty. It may be that the highly technical nature of the industry in many of its aspects sets up a barrier to the understanding of the simpler broad features. This lack of knowledge of an industry that is essential to the functioning of virtually all others becomes a real menace if it implies the shadow of a danger that, in an atmosphere created by general public misapprehension, national policy may be adversely influenced.

At West Ham recently Lord Citrine again spoke of the need for co-operation from all classes of consumers in reducing peak loads. The reserves of such co-operation have already been deeply trenched upon, however, and there are limits to the further losses and hardships that can be cheerfully borne by the public in a nominal peace time. Of the numerous methods of peak limitation considered by the B.E.A., he held out no hope of any being effective now. Even if they were, the Electricity Boards would have to seek legislative authority to enforce them and an appropriate Bill, which would embody undesirable and contentious features, would not have an easy passage through Parliament.

Short- and Long-Term Measures

Other means, such as the education of the public (including the distribution of explanatory leaflets to consumers) are slow in producing results. Tariff inducements on a wide enough scale would need lengthy and careful investigation. The confusion of necessary short-term action with

desirable long-term improvements must be guarded against, and the nature of the latter is made apparent in a progress report on "Operational Research" contributed by Mr. P. Schiller to the July *I.E.E. Proceedings* (*Part I*).

Lord Citrine's gravest statement was that the construction of power stations is being seriously retarded through lack of steel. One criticism that we have read is that the B.E.A. appears to regard priority for electricity generation as important as that for rearmament. In one sense that claim would be warranted. Without a rapid increase in electricity generating plant capacity both the defence programme and the export programme are in jeopardy, since unrestricted and uninterrupted supplies of electricity are vital to both. In this the B.E.A. certainly knows its own mind and has spoken with no uncertain voice. Confirmatory evidence that comes to us from the many sources to which we have access leaves us in no doubt that the B.E.A. is right.

PIMLICO DISTRICT HEATING

There could hardly be better conditions for successful district heating than those provided by the Churchill Gardens scheme described in this issue. The nearness of a large power station in which are installed the back-pressure turbines providing exhaust steam as the heat source is one important factor. Another is the small proportion of the power required for driving the auxiliaries of Battersea power station that these sets generate, so that the effect on overall efficiency is almost negligible. The absence of obstacles to heat distribution which are usually found in streets removes a serious problem. In addition to serving the present purpose well, the Pimlico scheme should provide valuable guidance in similar cases and also for drawing economic comparisons with the possible alternative of the heat pump.

INFLATION PROBLEM

The thesis put forward by the Government for last week's debate on the economic situation was one with which there could be little argument. It "recognized" the dangers of inflation and urged that "every effort should be made to check the rise in costs and prices and limit the pressure of excessive demand." From a discussion of the cost of living Mr. Gaitskell led up to the Government's decision to introduce a Bill to limit dividends. He referred to the "psychological consequences" of large increases in dividends and said he regarded such a measure as an essential prerequisite to checking increases in costs through higher wages and salaries. Alternatively, of course, it may encourage the idea that there is more money available to meet these claims. The principal criticism of the proposal however, is the inequitable treatment of those companies which have carried out voluntary limitation in the past.

GLEN AFFRIC

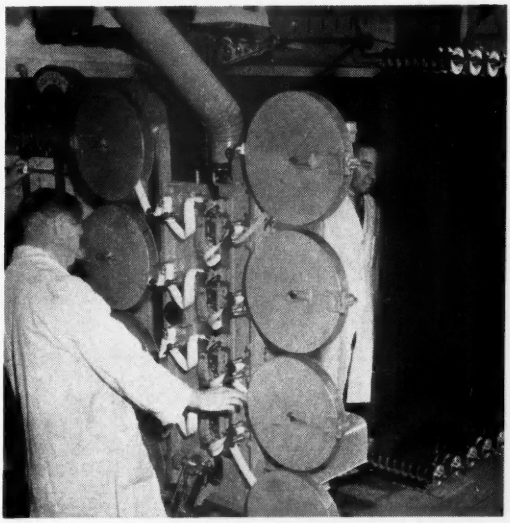
Little was heard, when the first 22,000 kW turbine at the Fasnakyle power station (Affric Scheme) was started up, to support the view that such development is "vandalism." In fact, the Scottish Press, with hardly an exception, warmly supports the view of Sir Hugh Mackenzie, who performed the inaugural ceremony, that this noted beauty spot has, if anything, been improved. When one remembers the controversies that raged around the several earlier schemes the accomplishment of the North of Scotland Hydro-Electric Board is all the more remarkable. A considerable advantage is that the new road which has been built makes the glen more accessible so that many more people can enjoy its beauty.

VALUABLE WASTE

During the war millions of tons of waste paper were returned to the mills for pulping and re-use. Since then many local authorities and others have not considered it necessary to continue their efforts, with the result that although more paper is being used less is recovered. This is a pity on two counts. First, the worsening of Britain's balance of payments makes it essential that imports shall be kept to the minimum. Secondly, with the latest rise in the price of newsprint to a level approximately twice that of a year ago, waste paper becomes a commodity of considerable monetary value. A target of 1,200,000 tons has been set for the collection of waste paper in the current year. Manufacturers and large business houses can dispose of their salvage through their local waste paper merchants whose addresses can be obtained from the Waste Paper Recovery Association, 52, Mount Street, London, W.1.

Film Processing

New Methods at the Associated British-Pathé Laboratories



Quadruple printing machine operating at 360 ft min

WITH the completion of a two-year reconstruction programme, the laboratories of Associated British-Pathé, Ltd., at 103, Wardour Street, London, provide film processing facilities designed to combine speed with the highest possible efficiency. Besides the various new techniques adopted (in particular daylight developing), comprehensive new systems of air conditioning and fluorescent lighting not only make possible an even higher standard of work but also improve operating conditions.

By the adoption of Debrie " Multiplex " daylight developing machines only two dark rooms have had to be provided. Normally the two machines installed in the negative developing room on the first floor of the building are operated entirely in daylight. For special types of work, however, where it may be considered advisable that the negative should be watched during the processing, lightweight steel shutters have been fitted to the windows. It is thus possible to convert this room into a panchromatic dark room in ten seconds.

Negative developing section illuminated by " Mazda " fluorescent fittings

Leading from this room is the main tank and pump room for these two machines, each of which can be operated independently. The adjacent grading room, into which extraneous daylight cannot enter to confuse the staff by variations in lighting, is equipped with a Western Electric densitometer.

The main printing room is on the next floor. Here the latest Bell and Howell

printing machines are used and there are four quadruple printers, each capable of printing at approximately 360 ft/min. Each quadruple printer is fitted with a continuous loop system which eliminates reloading of the negative during the printing of the Pathé newsreel. A small subsidiary printing room leading out of the main room is fitted with panchromatic lighting.

In the printing process not only the speed of travel of the film through the machine but also the light intensity of the printing lamp must be constant. To meet the latter requirement special photo-electric measuring apparatus has been made to Pathé design by Evans Electroselenium, Ltd. Routine sensitometric tests are also carried out in the laboratory referred to later. To guard against voltage fluctuations affecting print density all the printing lamps are fed from motor generators fitted with Isenthal voltage regulators with a stabilizer circuit which maintains a constant voltage of 110 V.

Also on the second floor is the positive examination department complete with specially designed tables, negative cleaning machines (in fume-proof cupboards) and two Vinten edge waxing machines. It is in this room that the prints are finally packed for despatch.

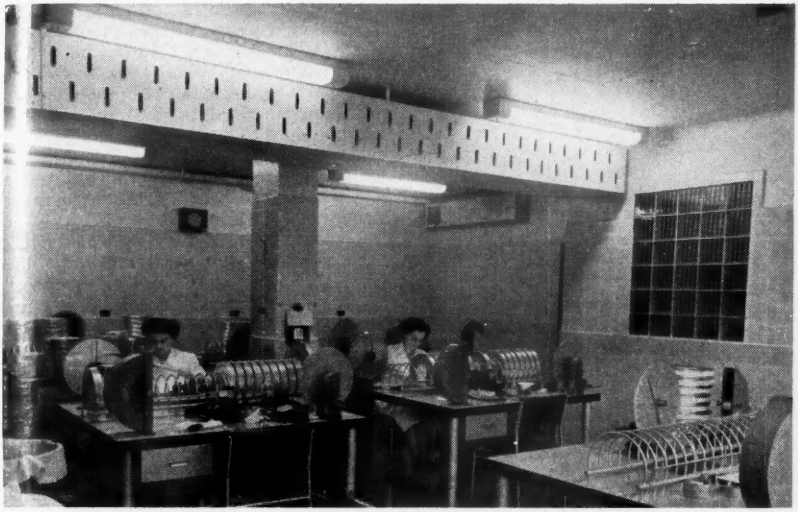
From the printing room the exposed film goes in light-proof magazines to the positive developing room on the ground floor. Here there are five daylight operated developing machines, each capable of an output of up to 8,000 ft/hr. Each machine is individually driven by a B.T.H. type CHT 3817 3 h.p., 400 V, three-phase variable speed commutator induction motor.

Since there is no natural lighting in this room, a partition of glass blocks, which has been built along one side to house the fans for the drying air for the " Multiplex " developing machines, is lighted from behind by fluorescent fittings to give a very realistic impression of daylight filtering through. The psychological advantage of this type of lighting, where there is no provision for natural light, has long been recognized and is here effectively demonstrated. Having regard to the speed with which the operators must answer the signal bell, calling for the reloading of each particular machine, it is essential that there should be no tendency to weariness towards the end of the day's work.

In addition to the administrative offices, the third floor of the building houses the test theatre, the projection box of which has two Ross 35 mm projectors (together with Nevelin rectifiers) and the latest R.C.A. sound equipment. The routine inspection of prints is also carried out on this floor by viewer projectionists who operate 35 mm projectors, using tungsten lamps as the light source.

Cold light projection equipment for final examination of prints

A great deal of attention has been paid to providing facilities for rigidly controlling the temperatures of all photographic solutions and for ensuring that at all times the activities of the developing baths shall be kept constant. With the assistance of Electronic Instruments, Ltd., a system of continuous pH readings has been provided, and will



Shadowless lighting is secured in the positive cutting room by using fluorescent lamps

eventually operate in every developing tank in the main circulation room. This system uses a series of glass electrodes and continually records alkalinity on a chart situated in the chemical testing laboratory on the fourth floor.

In this laboratory constant chemical analyses are made of developing solutions, the silver content of used fixers is determined and other specialized control work is carried out. Attached to the chemical laboratory is a small dark room containing an Eastman type 2b sensitometer, an Eastman process control sensitometer and other equipment for photographic testing.

On the same floor as the laboratory are the camera loading room, production offices, carpenters' shop, workrooms, and dressing and make-up rooms for artists performing in the studio on the top floor. This studio has been entirely replanned and refitted with the latest R.C.A. recording gear, arc and incandescent lighting up to 1,000 A, Ross projectors with synchronous drive, Newall cameras and the most up-to-date equipment for production.

Having regard to the locality of the laboratories it has been necessary to provide a method of complete air filtration and also to control humidity in all the rooms in which film is handled. Room had therefore to be found in the basement for an air conditioning apparatus, supplied by the Carrier Engineering Co., Ltd. The air enters the building by means of the main air shaft on the first floor and is washed and filtered before reaching the thermostatic control apparatus. The Ideal boilers have oil feeders made by Combustions, Ltd., and are completely automatic in operation.

The refrigeration is carried out by two Lightfoot freon reciprocating compressors each driven by a Hugh J. Scott 25 h.p. motor controlled by Airedale Electrical Manufacturing automatic starting gear. Thermostats in the cold water tank determine whether both, one or neither machine shall run. A comprehensive instrument panel gives indications of temperature, pressure, etc.

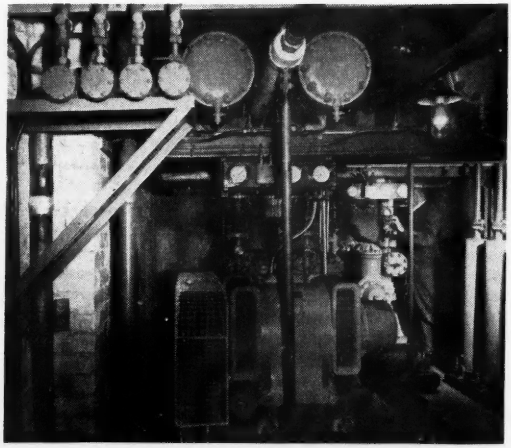
In the basement too are the Mitchell chemical mixers ($\frac{1}{2}$ h.p. motors) and the solution storage tanks. The developer solutions, maintained at the required temperature by means of "Inconel" heating and cooling coils (Henry Wiggin) and Short & Mason thermostatic control apparatus, are circulated by pumps constructed of ebonite and driven by 1 h.p. motors.

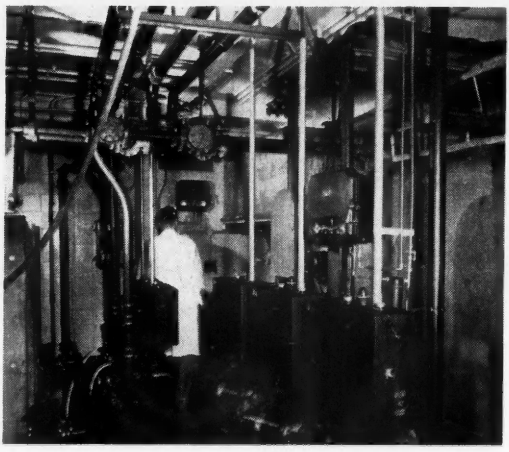
Close by is the silver recovery room which has been laid out from experience

gained from a pilot plant installed in the company's Elstree laboratory. Here all used fixing solutions are returned by gravity for treatment in four electrolytic separation vats. The violent turbulation necessary in this process is achieved by the use of " Perspex " paddles revolving at 90 r.p.m.

The direct current necessary for the operation of this plant is provided by two Westinghouse rectifiers, 400 V, three-phase, 50 c/s input, output 500 A at 8 V. Control is by means of two four-position tapping switches on each set, allowing fifteen steps of control. Finer control is effected by means of Zenith Electrical " Variacs " in the input side, reducing the output to about 1 V and 25 A. After the silver has been taken out of the solution the fixer is regenerated by the addition of a small amount of hypo and is pumped back again to the developing machine. An Evans Electroselenium colorimeter is used for rapid assessment of the amount of silver in the baths.

To provide ready access between the various departments two automatic lifts (manufactured by Marryat & Scott) have been installed, one carrying six passengers and the other goods (2,000 lb); and there are also two hoists for film transport. Intercommunication is both by telephones (Telephone Rentals) and a public address system (Philips).



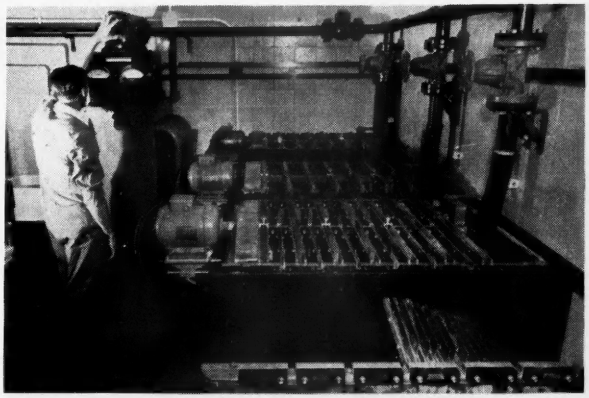


Left : **Main tank room showing circulating pumps.** *Above :* **Part of the air conditioning plant**

A high standard of lighting has been demanded to facilitate the work of the laboratory. Throughout the building " Mazda " fittings are employed, the actual type of fitting in each case having been chosen in accordance with the work carried out. In areas where film is handled, fittings are of the F1210 type since these comply with safety regulations and also ensure a good diffusion of the light. Most other areas, including passages, are illuminated by F1010 fittings, while the basement has tungsten lighting. The executive offices have F1214 louvred fittings which combine a pleasing design with high efficiency lighting. There is a general intensity of illumination throughout the building of 20 lumens/sq ft, but this is increased wherever the visual task calls for a higher level.

The greatly increased use

Right: **Electrolytic silver recovery plant.** *Below:* **Switchroom with motor generators for supplying d.c. for the printing machines**



electrical equipment has necessitated the provision by the London Electricity Board of a transformer chamber housing a Brockbridge 500 kVA 11,000/400/230 V transformer with B.T.H. ring main unit, together with an English Electric low voltage distribution board and a B.T.H. low voltage 800 A air-break circuit breaker.

Adjoining the transformer chamber is the main switchroom housing not only the Simplex switchgear and Allen West starters but also the Fuller motor generators supplying d.c. for the printing lamps. The electrical installation was carried out by Pulver & Co., Ltd. to specifications prepared by Mr. J. Winskill, A.M.I.E.E., Associated British Pathé supervising engineer. With the completion of the re-equipment of the laboratories in Wardour Street the company's laboratories at Elstree are now being turned over completely to the processing of sub-standard films.

South African Airport Lighting

A CONTRACT for all the airfield lighting and other items of electrical equipment required for installation at the new Jan Smuts Airport, Johannesburg, has been placed with the General Electric Co., Ltd. High intensity and low intensity lighting is being provided on two runways, the longer of which extends for nearly two miles. This and another of about 2,800yd are instrument landing runways and will be equipped with the British line and bar system of approach lighting as recommended by the International Civil Air Organization for use in poor visibility. The third runway (also approximately 2,800yd) will have low intensity lighting only. Landing direction will be shown by an illuminated tee operated remotely from the control tower, and the wind cone will also be illuminated at night. The G.E.C. is in addition supplying the location beacon and obstruction lights for the airfield.

The electrical equipment comprises h.v. and l.v. switchgear, substation transformers, a control panel and all contactor gear for remote operation of the airfield lighting services from the control tower, and a 150 kVA standby diesel automatic generator set. All the cable for the runway, taxiway and approach lighting will be supplied by the G.E.C.

VIEWS on the NEWS

By REFLECTOR

SPEAKING by and large, the way in which the lay Press handles electrical matters is either amusing or perturbing. Therefore, when I come across an exception my heart leaps up as Wordsworth's did when he beheld a rainbow in the sky. In the *Sunday Times* of 29th July there was such an exception; the facts behind the power shortage were set out by a correspondent in a succinct and objective manner. There was nothing in it that was not familiar to readers of the *Electrical Review*, but it put the situation clearly before the general public. On the same day the *Observer* made another reference to the power position suggesting, in effect, that the use of electricity was somewhat sinful these days and should be curbed, without distinction between peak and off-peak use.

* * *

Encouraging results are reported from Southern Rhodesia of experiments in the use of electricity for killing eelworm in tobacco plantations. By placing electrodes in the seedbeds and passing a current of electricity through them it was found that 71 per cent of the plant roots were free from eelworm compared with only 17 per cent in a neighbouring untreated seedbed. The frequency of the current employed is apparently somewhat critical if the beneficial organisms in the soil are not to be harmed. A unit is being designed for attaching to the farm implements so that the soil can be freed from eelworm as it is cultivated. I understand that further experiments are being carried out to see what other pests may be destroyed by this means.

* * *

Among mechanical farming operations the supply of traction power in the fields is probably the only one in which electricity may have been considered at a disadvantage. I am glad, therefore, to hear of a farmer advocating the use of electric battery driven tractors as an alternative to petrol and paraffin types. Addressing a conference of the Association of Agriculture in Perth, Mr. A. D. C. Main said that farmers had so far tapped only one source of energy for driving their tractors and this was imported and subject to interruption in supply. He felt that the use of electricity for this purpose was definitely worth considering and the load would be off-peak. The weight of the battery would not be likely to prove a handicap since the pneumatic tyres of petrol or paraffin driven tractors are commonly ballasted with weights or water to the extent of as much as 4 cwt per wheel to give them additional grip and tractive power. Stability would be assured by draw-bar pull from the front axle.

* * *

Statistics regarding electricity consumers in Korea are only of academic interest, I learn. A former U.S. War Department operations engineer, writing in the *Electrical World*, tells of the adeptness of the Koreans in making their own service connections with a span or two of wire cut from a place where it will not affect their own particular "service." Attempts to disconnect the stolen load, estimated at 20,000 kW, were abandoned because no sooner would the linesman disappear down the road than the householder would shin up the pole and reconnect. It is not stated how many casualties there were, but apparently the natives are quite fearless where electricity is concerned. The writer says that Korean linesmen employed by the authorities refused to wear gloves. "With 3,000 V lines fallen hot to the ground, a man would dip his hands in a bucket of transformer oil and then, with bare pliers, cut the wire." He adds, "We lost 30 linesmen per month."

* * *

Extract from a report by the Bassein Rating Committee on the charges of the Bassein Electric Supply Co.:—

> "Item (iv) Interest on Loans advanced by Board.—There being no Board there is no loan by Board. Nothing is claimed in the working sheet."

Under-Water Cables

Crossing the River Yare at Great Yarmouth

By W. S. KELLY,
B.SC., A.M.I.E.E.*

TO cater for the rapidly increasing demand for electricity in the Lowestoft and Gorleston area on the Norfolk–Suffolk border, the Eastern Electricity Board has recently installed fifteen new cables beneath the River Yare where it forms the harbour for the seaport of Gt. Yarmouth.

The river at this point is 300ft wide, 20ft deep, with a tidal rate of 7 knots and, because of unusual weather and other unforeseeable conditions, the operations proved far more difficult than was at first envisaged. At times the work assumed a very grim aspect, even to the point of exacting the toll of two lives—one by impact with a steel pile and the other by the failure of a crane component.

Previous installations of three, six and nine cables respectively were carried out in the same vicinity in 1900, 1924 and 1934, but by the winter of 1948 supply to this area was again causing great anxiety because some of the under-water cables were operating for long periods under severe overload. Two of them had been temporarily relieved by increasing the transmission voltage of bulk supply from 22 to 33 kV, but as they were of an early h.v. design and had been operating for some sixteen years at the lower voltage it was problematical whether the operation engineer's anxieties were relieved to the same extent.

To reinforce the existing system adequately and to provide sufficient reserve capacity for all future development that can be foreseen, two 0·35 sq in and three 0·25 sq in, 3-core, 33 kV, h.s.l. cables, four 0·25 sq in, 3-core, 11 kV, belted cables and six 4-pair 7/·036 plus 6-pair 1/20 s.w.g. combined pilot and telephone cables were ordered. These fifteen cables, each 150 yards in length, were all of class p.l.y.s.d.s. specially manufactured by British Insulated Callender's Cables, Ltd., and were installed by the B.I.C. Construction Co. the main contractor under the direction of the Norfolk Sub-Area engineering staff. The Gt. Yarmouth Port and Haven Commissioners provided valuable information about quay-head conditions, tidal rates, etc., and without their help in regulating river traffic the crossing would have been impracticable. Even so, consideration of tidal and dredging depths, the annual stay of the herring fleet, the pleasure steamers operating continuously throughout the summer and other factors made it apparent that the river crossing could only be undertaken during one particular period of the year, May to early June.

Experience during the war years caused some doubt as to the general security of the quay at the point of crossing and having regard to the number of cables involved and the extensive excavations necessary for approach trenches, the Commissioners were obliged to stipulate that the civil works on each bank must be carried out within the confines of screens, forms of Larssen interlocking steel-sheet piles.

Difficulty was experienced in obtaining the services of a dredger which could dredge to a depth of 8ft below the river bed, but after prolonged search in this country and abroad the *Great Ouse II* made passage by sea from King's Lynn to Gt. Yarmouth, a hazardous journey for such a cumbersome craft. The cost of insuring the vessel and meeting the capital and other charges for the sea trip alone far exceeded the total operational costs of any previous river crossing.

Work began in the spring of 1950 with the erection of a 45ft pile crane on the east bank and the provision of a 75ft Butters crane and a self-propelled mechanical excavator. On the west bank a 35ft pile frame and excavator were provided and steam operated Terry McKieman hammers were used for driving the steel piles and a "Zenith" extractor was used for their withdrawal.

* Engineer, Norfolk Sub-Area, Eastern Electricity Board.

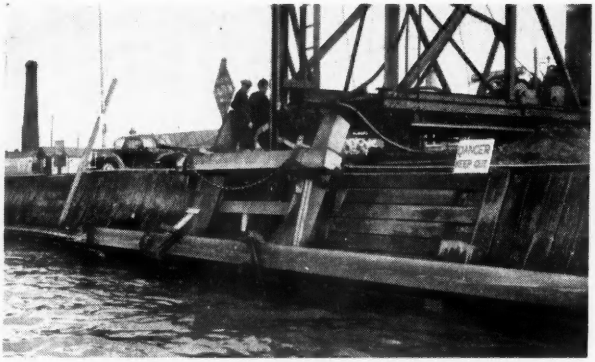


Fig. 1.—East bank face showing timbers securing quay against outward thrust

The first stage of construction proper commenced on 18th April with the driving of two 40ft long by 14 sq in timber piles against each quay face (Fig. 1) on the line of the proposed approach trenches to secure the footings of the quay against outward thrust when the water rushed in behind the quay face. The piles against the west quay were driven without difficulty, but some concern and delay was caused by striking a hard object on the river bed against the east quay, possibly part of an old ship.

Yarmouth Quay reaches far back into history and metal tie rods held the wooden quay face in position, being anchored back to concrete pillars inshore. Some of them had disintegrated and while they were being replaced the quays had to be temporarily held back by a 43ft long 14 sq in timber beam fixed horizontally to the face of the quay (Fig. 1) and lashed back to an anchorage point clear of the working areas.

On the east bank the front screen of Larssen No. 3 heavy section piles was driven parallel to and 1ft 6in from the edge of the quay. From its ends two walls of No. 1 G. B. Larssen piles (medium section) were then driven, extending 30ft inland and graduated in depth to suit the desired slope for the approach trenches. Excavation was then carried out within this enclosure with internal wooden supporting framework (Fig. 2).

The approach trenches were under water to a great extent and even in the "civil works" divers had to be employed in levelling off the bottom of the track and clearing obstructions. Grab excavators were used on the cable trenches and at the scheduled depths a 9ft long horizontal slit was cut in the front steel piles blocking the approach trenches. The tops of the cut piles were then partially withdrawn to form a "window" below the river bed level through which the cables were to enter the river. Through this window divers then cleared the 1ft 6in space between the piles and the quay face.

Four divers of Underwater Welders & Repairers, Ltd., tried underwater lighting, but it was ineffective owing to the muddy water. In cutting the 9ft long slit in the steel pile the divers experienced considerable difficulties in operating the electric arc cutting equipment. The muddy water

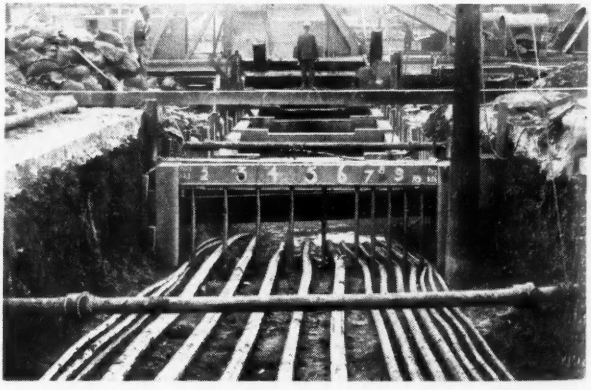


Fig. 2.—Fifteen cables passing through numbered grill in approach trench

had an adverse effect on arc dissipation and caused frequent blockage of oxygen supplies; also the equipment was constantly "spurting." The divers usually changed the carbon electrodes under water, and it was found that sand, suspended in the water by the passage of ships in the narrow channel, obtained access to the electric cable at those times with dire results later.

When the space between the piles and the quay face was clear, openings in the existing timber sheathing of the quay wall had to be cut near the bed of the river. The divers could make very little impression on the tough jarrah sheathing timbers, even with chain saws driven by compressed air. Saws were quickly broken and the buoyancy of the divers, combined with the strong tide, caused them to float back from the quay face as soon as they tried to bring any pressure to bear with their saws. Finally the timbers were hauled out bodily by the dredger and new, ready cut and drilled, greenheart timbers substituted by the divers. This operation was carried out safely, but torrential rain caused serious subsidence on the east bank and the fracture of a main drainage pipe. As if fate had not been unkind enough, a "sand blow" then started on the floor of the east bank excavation. This difficulty was overcome by driving piles in steps to varying depths in the approach trench, thus giving a hold to the shifting sands.

Meanwhile the *Great Ouse II* had commenced main dredging operations in the river and it was unfortunate that the difficulties encountered upset the co-ordinated programme. To accommodate the fifteen cables at the desired spacing of 1ft 6in between 33 kV cables, 9in between 11 kV cables and 6in between pilots, it was necessary to excavate a trench some 100ft wide at the top in the river bed. As this trench also had to be 8ft below the river bed, entering from the east quay wall at 18ft below l.w.o.s.t. (low water ordinary spring tide) and passing through the west quay wall at 13ft below the same datum level, vast quantities of mud, stone and sand had to be excavated. The *Great Ouse II* attended by the tug *Lincoln Steeping* and four 120 ton hopper barges removed from the river bed approximately 5,000 tons of material which was dumped out at sea in 58 barge loads.

For pulling, each cable had a steel shackle made fast to the armouring wires and, to ensure that the cables entered and left the river in the correct order, a labelled grill was built into each approach trench (Fig. 2). The steel wire hawser used for pulling in was attached to each cable in turn and was carried back across the river by the tug after each pull, the divers passing it through the underwater opening. It was then taken up by an engine driven winch equipped with a dynamometer. To avoid overlying in mid-river the cables were pulled through during the period preceding slack water, cables to the south of the centre of the trench being pulled through on the ebb tide and those to the north on the flow tide.

The first to cross the river was a 0·35 sq in 33 kV cable which was pulled from the east to the west bank in just over half an hour. While the inertia of the cable and cable drum was being overcome the dynamometer registered a wildly fluctuating tension, peaking at about 4 tons. Once the cable was on its way, however, tension dropped to a comparatively steady 1½ tons, which increased slightly as the cable entered the west

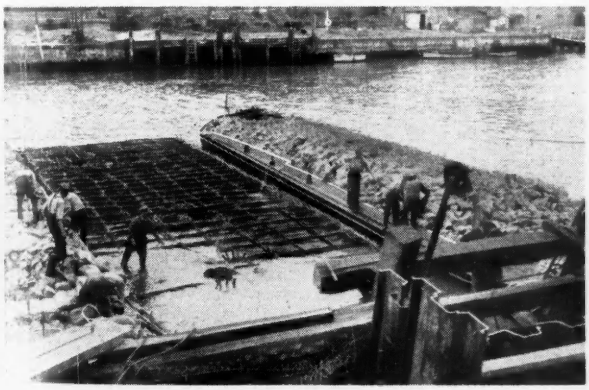


Fig. 3.—Sinking of brushwood protective mattress over river bed cable trench

bank sea wall opening and came up the ramp.

Pulling in began at 5 p.m. one day and the last cable was across before midnight on the following day. The divers again walked the river bed to check positions and then 300 tons of shingle was distributed along the trench to cover the cables to a depth of 2ft, while further protection against vessels dragging their anchors was provided by brushwood mattresses, each 100ft long, 20ft wide and about 1ft 6in thick. They were made on the river bank by knocking pegs into the ground and weaving and lashing brushwood to the pegs. The mattresses were towed out over the trench and from two hoppers anchored either side stones were thrown on to the mattresses, which gradually sank into position over the cables (Fig. 3). For 50ft out from the east quay and 25ft out from the west quay bagged asphalt was used in place of stones to avoid possible damage to the hulls of ships lying on the mud at low water. The trench was then filled to the normal river bed levels with materials dredged from another part of the river.

The Belfast Undertaking

City Electrical Engineer's Report

ALTHOUGH there was a net surplus of £111,923 on the past year's operations of the Belfast Municipal Electricity Department, the city electrical engineer and manager (Mr. W. J. McC. Girvan) foresees the need to increase charges. In his report for 1950–51 he points out that the rise in costs last year gained on that in revenue by upwards of £9,000. This, he concedes, is not a serious matter in the year's trading—on a total revenue of £1,840,741—but he estimates that in the current year the expansion of income will have fallen behind that of expenditure by £40,000, without taking into account the latest wage and salary increase claims. The effect of these trends will be to make an increase in basic charges inevitable; it can be deferred for a while, but not later than the end of the current financial year.

With a balance of £14,186 brought forward, last year's surplus made a total disposable sum of £126,109, of which £13,938 has been applied to miscellaneous capital works, £1,033 is written off obsolete stores, £50,000 transferred to renewals and a similar sum allocated to debt redemption. An appeal has been lodged with the Commissioner of Valuation against an increase of £10,000 in the assessment of the undertaking which became effective on 1st April, 1950.

Capital expenditure during the year aggregated £995,943, making £9,480,858 to date, while the net debt of the undertaking at 31st March last was £4,588,432.

Development in sales was at the rate of 12·48 per cent, being most rapid in domestic and general power supplies, both of which increased by more than 16 per cent. The smallest gain (under 2 per cent) was in supplies to shipyards. Sales to the various classes of consumers last year and in 1949–50 were as follows, in million kWh:—Lighting, 18·1 (16·8); domestic, 102·4 (88·2); general power, 151·3 (130·1); shipyards, 42·6 (41·8); and transport, 40·4 (38·5). An additional 7,235 consumers were connected, making 121,852.

The Department's Harbour power station generated 382·8 million kWh, an increase of 20 per cent. Work is proceeding for the accommodation of No. 9 turbo-alternator together with associated boiler plant. A new power station (Victoria) is also to be constructed on a site on West Twin Island. Major transmission extensions during the year included the laying of two oil-filled feeders between the Harbour power station and East Belfast.

Sheffield's Tramways

EIGHTEEN new tramcars were placed in service in Sheffield during 1950–51 and two were disposed of, making the number of cars in stock 459. Car-miles run (12·9 million) and passengers carried (168·9 million) both show a reduction—a trend which has been noticeable for several years. Energy consumption amounted to 38·8 million kWh, or 2·999 kWh/car-mile.

Reflecting the effect of fare adjustments which came into operation at the end of December, income increased from £1,371,627 to £1,384,592 (from 25·247d to 25·702d per car-mile), against which working expenses decreased from £1,324,049 to £1,284,486, and there was a gross surplus of £100,106 (£47,578). When allowance is made for interest, debt redemption charges, etc., and £120,000 provision for renewals, the final result is a deficit of £41,095 (compared with a £97,015 loss in 1949–50). Including also the bus services, there was a loss on the year's working of £95,042, making the adverse balance carried forward £186,537.

All-Electric Flats

Study of Space-Heating Load Characteristics

By P. SCHILLER, Dipl.-Ing., M.I.E.E.

A PREVIOUS article* described the electrical equipment of a block of 56 all-electric flats, erected by the Hammersmith Borough Council on its Aspen Gardens Estate. Each of them has one living-room, whereas 27 have one bedroom, 12 have two and 17 have four; the corresponding weekly rents are 19s 3d, 25s 3d and 30s 9d, respectively. The external floor areas range from 570 to 820 sq ft and each flat is fitted with the following appliances:—

Kitchen: cooker, kettle, 20 gall u.d.b. water-heater, 1 kW reflector fire on wall.
Living-room: 2 kW imitation coal fire.
One bedroom: 2 kW inset panel fire.
Linen cupboard: 2ft tubular heater.

A communal laundry is available on the estate and appears to be used by about 70 per cent of the tenants. It can, therefore, be assumed that in most cases no substantial clothes-washing is done in the flats. Upon inquiry, the tenants expressed themselves as fully satisfied with the heating service obtained.

In what follows some results are given of an investigation carried out by the Utilization Research Committee of the British Electricity Authority.

The average size of household was found to be 3·5, which is relatively large for these mostly small flats.

Load Analysis

The accompanying graphs are after-diversity-demand (A.D.D.) curves for a winter and a summer working-day, and a similar pair of Sundays. In each case the difference between the curves for the two days is likewise plotted. The winter working-day curve is remarkable for the relatively low morning A.D.D., indicative, apparently, of the circumstance that most of the consumers do not use the living-room at that time. Starting about 4 p.m. the demand becomes much heavier, reaching its maximum just after 6 p.m. Some characteristic A.D.D. values are listed in Table 1, together with the corresponding "effective" load factors, based on an average annual consumption of 5,900 kWh/consumer (in 1949).

TABLE 1.—CHARACTERISTIC LOAD DATA
(Winter Working-day)

	8.00–8.30 a.m.	12.00–12.30 p.m.	4.30–5.00 p.m.	5.00–5.30 p.m.
A.D.D. per consumer, kW	1·5	1·5	1·4	1·8
Corresponding effective load factor, %	45	45	48	38

In comparsion with the usual load factor of the domestic load, the present values appear to be remarkably good. The graph also shows that the Sunday A.D.M.D. just exceeds 3·5 kW/consumer. The corresponding load factor is about 19 per cent, which is not worse than with traditional housing estates when cooking is done electrically.

Consumption Analysis

To study the seasonal variation of the consumption, monthly meter readings were taken on a sample of 20 consumers and are set out in Table 2.

TABLE 2.—AVERAGE MONTHLY CONSUMPTIONS OF 20 CONSUMERS

Month	Average consumption per consumer, kWh
August, 1949	280
September, 1949	315
October, 1949	335
November, 1949	610
December, 1949	645
January, 1950	745
February, 1950	755
March, 1950	575

* All-Electric Flats, *Electrical Review*, 3rd December, 1948, p. 877.

Allowing for the holiday period, it could be estimated that the "basic" monthly consumption was about 300 kWh/consumer. This figure may contain a slight amount of space-heating, say, 20 kWh, and the remaining 280 kWh correspond to 3,350 kWh/year. Assuming, further, that lighting, cooking and water-heating account for a seasonal component of, say, 550 kWh, the annual space-heating consumption can be roughly estimated as (5,900−3,350−550 kWh) = 2,000 kWh. The total of 5,900 kWh would then be made up as follows:—

	kWh/year
Space-heating	2,000
Cooking	1,600
Water-heating	2,000
Lighting, etc.	300
Total	5,900

These are only approximate figures, which would require corroboration by further tests. It may be added, in passing, that the annual consumption of the communal laundry amounts to 570 kWh per flat, or 860 kWh per user.

Space-Heating Component

The small space-heating consumption of about 2,000 kWh/consumer could be explained by (a) the mildness of the winter of 1949–50; (b) the compact layout and relatively small average size (about 700 sq ft) of the flats, coupled with absence of flues; (c) the predominant use of the kitchen for meals and as a living-room; the kitchen also being small, receiving some "background heating" from the u.d.b. heater and a further supply of heat from the cooker.

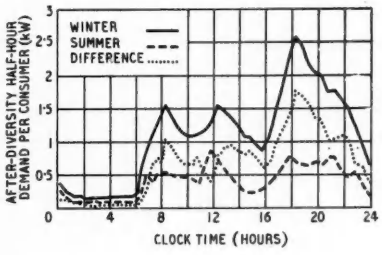
Some idea of the space-heating load curve can be gained from the difference curves (Figs. 1 and 2) although the difference between the A.D.D. in winter and summer is due not only to space-heating but also to lighting and, possibly, to some extra demand for cooking and water-heating as well (partly caused by the lower cold-water temperature). With estimated allowances for these additional factors, the A.D.D. values stated in Table 3 can be assumed for the winter working-day in question, on which the temperatures at 6 a.m., 12 noon, and 6 p.m. were, respectively, 25, 37 and 33 deg F. Table 3 also gives the corresponding effective load factors.

TABLE 3.—ESTIMATED SPACE-HEATING A.D.D. VALUES AND CORRESPONDING EFFECTIVE LOAD FACTORS

	8.00–8.30 a.m.	12.00–12.30 p.m.	4.30–5.00 p.m.	5.00–5.30 p.m.
A.D.D. per consumer, kW	0·9	0·8	0·9	1·1
Corresponding effective load factor, %	25	28	25	21

A noteworthy feature of the working-day curve is that the bulk of the space-heating load comes on in the evening, in keeping with the suggestion that in these flats liberal use is made of the kitchen for meals and as a living-room, the actual living-room being used chiefly in the evening. Likewise of interest is a comparison with previous investigations (see, for instance, Figs. 4 and 5 of E.R.A. Report Ref. K/T124) which showed that when electric space-heating is employed supplementary to solid-fuel appliances, the early-morning demand predominates.

From the Sunday curve it can be seen that around tea-time the space-heating



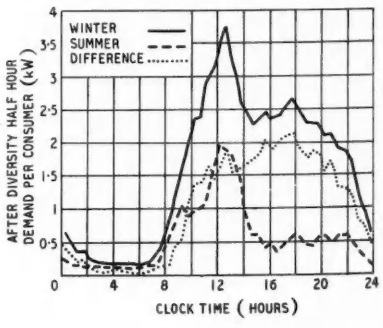


Fig. 1 (*above*).—**After-diversity-demand curves for weekdays. Fig 2** (*right*).—**After-diversity-demand curves for Sundays**

D.D. was of the order of 2 kW/consumer the loading of the living-room fire.

At a power station coal consumption of ·7 lb/kWh (sold) the space-heating consumption of 2,000 kWh corresponds to bout 1½ tons of power station coal, equivant to about 25 cwt of house coal, while ne house-coal equivalent of the total onsumption of 5,900 kWh is only 3¾ tons.

It is by no means a novel observation hat large sections of the population find it onvenient to take most of their meals in he kitchen and to use a separate living-oom only for part of the day. The above esults may be taken as at least a tentative ndication that for housing of the type concerned, all-electric space-heating may be an economic possibility when power station capacity can again be made available for this purpose. It would, however, be rash to draw general conclusions (even as to the particular type of housing, and certainly not as to housing in general) from one block of flats with 56 consumers.

The main interest lies in the evidence this case provides that the economics of house-heating cannot finally be decided on the basis of either academic "efficiencies" or small-scale practical tests (including those at Abbots Langley) but only by well-planned trials on a large scale.

Affric Hydro-Electric Scheme

First Set in Operation at Fasnakyle

SIR HUGH MACKENZIE, a member of the North of Scotland Hydro-Electric Board, recently switched on the first of three generating sets at Fasnakyle, the main station of the Affric power project, following successful preliminary tests. The Board expects that the full output of 66,000 kW will be available about the end of the year.

The Benevean dam, 516ft long, 88ft high and 80ft thick, has raised the level of Loch Benevean by 30ft and increased its length to 5 miles. Through the woods on the north shore the Board has built a motor road that commands a view of every tree-studded island and much of the high ground to the west and south.

In order to maintain a constant level in Loch Benevean the scheme employs Loch Mullardoch in the neighbouring glen as a storage reservoir. To connect the two lochs a low-pressure tunnel 3½ miles long has been driven through the mountains. A high-pressure tunnel connects Benevean with the main generating station at Fasnakyle.

The principal work that remains to be completed is the Mullardoch dam, the largest in Scotland—2,935ft long and 120ft high. It will raise the level of the loch by about 100ft. At the mouth of the tunnel that links Mullardoch to Benevean an underground power station, with a capacity of 2,400 kW and an estimated output of 8,000,000 kWh a year, is now under construction.

The river Glass, which was diverted during construction of the Fasnakyle power station, flows again in its natural course. The power station building, a steel-framed reinforced concrete structure, is to be faced with golden yellow sandstone from the Covesea quarries at Burghead; the same stone has been used in the construction of the Fasnakyle substation, and is being used in the 17 houses which are being built at Cannich for the Board's staff.

Power produced at Fasnakyle and the smaller station at Mullardoch will be led to this substation by underground cable. The connection with the Beauly substation, which will also be linked to the Shin and Conon basin group, is by overhead line. From the Fasnakyle substation a line has now been built to Fort Augustus. This will be used initially to supply power during the construction of the Garry and Moriston schemes in the Great Glen. When they are complete it will serve to transmit the power produced there back to Beauly and into the Highland grid.

Sir Hugh Mackenzie, speaking at an informal dinner at the end of the tour, said that when operations started some fear was expressed that the Board would spoil the amenities of Glen Affric. Instead of spoiling amenity the result had been to improve it. As at Sloy, the Board had created many miles of new road by which visitors could have access to some of the most beautiful country in Scotland. The decision to use stone wherever possible in building had been the means of reviving not only the Burghead quarries but those at Tarradale (Muir of Ord).

Electrical Installations

Adwick-le-Street U.D.C. is to install electricity in 146 houses at the Woodlands estate and 86 on the Carrcroft estate.

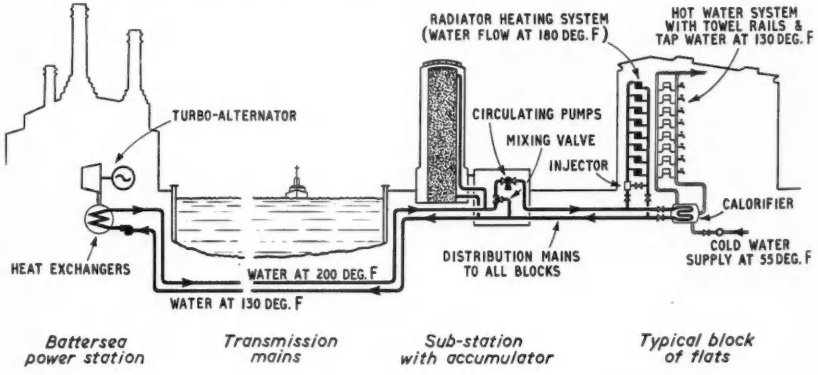
Churchill Gardens

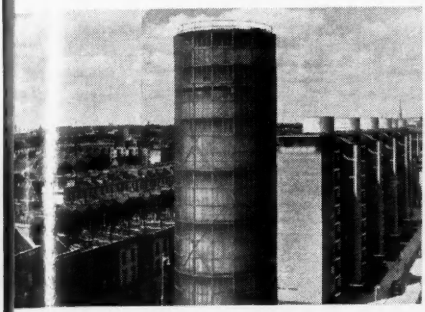
District Heating in Pimlico

THE principal post-war housing scheme of the City of Westminster, named after Mr. Winston S. Churchill, its first honorary freeman, was officially inaugurated on 24th July by the Duchess of Marlborough. Over 1,600 flats, in addition to some shops and public buildings, are to be erected on a 33-acre site adjacent to Grosvenor Road, Pimlico. In the first 10-acre section are 495 flats and 13 shops, most of which, in seven- to nine-storey buildings, served by electric lifts, are now in occupation. Each kitchen is equipped with points for an electric or gas cooker, a refrigerator and an electric iron; cookers and refrigerators are hired or purchased by tenants. All rooms have plug-points for electric fires, radio and vacuum cleaners. A relay wireless system is available at a weekly charge.

Hot water for central heating and for taps is supplied from Battersea power station as indicated in the accompanying diagram. Tap water is heated by calorifiers and is thus separated from the source of heat, as recommended in the recent report on district heating (*Electrical Review*, 20th July).

Diagram of the Pimlico district heating scheme. Our title photograph shows the relation of the new flats to Battersea power station


RADIATOR HEATING SYSTEM (WATER FLOW AT 180 DEG. F)
HOT WATER SYSTEM WITH TOWEL RAILS & TAP WATER AT 130 DEG. F
TURBO-ALTERNATOR
CIRCULATING PUMPS
MIXING VALVE
INJECTOR
CALORIFIER
HEAT EXCHANGERS
WATER AT 200 DEG. F
WATER AT 130 DEG. F
DISTRIBUTION MAINS TO ALL BLOCKS
COLD WATER SUPPLY AT 55 DEG. F
Battersea power station
Transmission mains
Sub-station with accumulator
Typical block of flats



The electrical output of the two 1,350 kW 6 to lb/sq in back-pressure turbo-alternators in Battersea power station, which provide exhaust steam for primary heating at 2 lb/sq in, supplements the supply to the station auxiliaries. Standby supply of heat is obtainable from the boilers through steam-pressure reducers. Hot water from the heat exchangers is pumped under the River Thames through 12in flow and return pipes insulated with 2in of compressed cork, which are run in a tunnel of the Metropolitan Water Board.

The accumulator is 29ft in diameter and 126ft high, one-twentieth of the volume that would be required to store the same quantity of heat as coal gas, and insulated with 3in of compressed cork slabs. Temperature is thermostatically controlled by mixing with cooler return water. The radiators are designed to give 65 deg F in living rooms, 60 deg in bedrooms and 55 deg in kitchens when the outside temperature is 30 deg. For tap water the temperature is 130 deg, based on a daily demand of 15 gallons per head.

The system is to be extended to the existing flats in Dolphin Square and for these and the completed Churchill Gardens the annual heat consumption is estimated at 1,670,000 therms, in the production of which 9 million kWh will be generated at Battersea. Tenants expressed to us their entire satisfaction with the system during last winter.

The district heating scheme was prepared by Mr. S. B. Donkin, consulting engineer, in collaboration with the late Sir Leonard Pearce, engineer-in-chief of the former London Power Co. It was referred to at the inaugural ceremony by the Minister of Fuel and Power (Mr. P. Noel-Baker) as a timely Festival exhibit, as it was probably the first of its kind in the world. The use of spare heat was, he considered, of the greatest significance as he doubted whether any country could continue to produce power for many years at the present rate of fuel consumption. The present scheme would serve 10,000 people and save 10,000 tons of coal annually.

This housing scheme is one of the most modern now under construction. It was designed by Messrs. Powell & Moya, A/A.R.I.B.A., winners of the open competition set by the Westminster City Council.

Electricity is distributed to the flats by means of rising main cables with feeding boxes on each floor from which run cables in conduit for all sub-circuits. For this work the electrical contractors, Troughton & Young, Ltd., are using paper insulated mass-impregnated non-draining cable, rising main boxes and v.i.r. cables made by British Insulated Callender's Cables, Ltd.

T.U.C. at Blackpool

THE 1951 Congress of the T.U.C. will commence on 3rd September at Blackpool. Among the resolutions to be considered from affiliated organizations, the National Engineers' Association expresses concern at the numerous accidents occurring on the various power plants throughout the country, due to unqualified persons being engaged on such plants, and requests the General Council to make representations to the Government with a view of operating a "Persons in Charge Bill" which would authorize only certified persons to be engaged on the engine room and boiler house staffs.

A resolution of the Electrical Power Engineers' Association notes with concern that continued load shedding and the progressive curtailment of essential electricity supplies to industry are inevitable for a long period to come unless the allocation of capital to the nation's electrical system is increased. The Association calls upon the General Council to review the latest facts and figures given publicity by the chairman and deputy-chairman of the British Electricity Authority, and to make appropriate representations to the Government on the gravity of the present electrical situation in relation to industrial production.

The Electrical Trades Union deplores the steady deterioration in the living standards of the workers, due to the rise in the cost of living, and the continued rise in profits, and it urges the Congress to declare that further wage increases are essential for all sections of the workers, and that the standards of living must be improved at the expense of profits.

Engineering in Europe

Survey of Current Literature

THE author considers the effects of line extremities (open and short-circuited) and transitions between lines (with differing surge impedances), or the earthing of lines through parallel resistances, on the travelling waves. The reflection phenomena and their effects in increasing the dangers at certain points of the line are discussed and also the distortion of the waves by corona.

The three main groups of divertors, namely those with voltage-dependent resistance (cathode-drop type, resorbite, thyrite and metrosil divertors), the glow-discharge high-current type (crystal-valve, autovalve and pellet divertors) and the expulsion spark-gaps, are discussed in detail and the specific indications for the preference of any of these types for a certain purpose pointed out.

The relations between insulation levels and type of earthing of the systems and the stations, on the one hand, and the most appropriate type of divertors, on the other hand, are outlined and general principles for the erection of divertors established. The deductions are based on experience gathered in many countries and under widely varying conditions, the few typical examples given referring to Spain.—" Surge Protection by Divertors," P. L. Lecuona, *Der Elektrotechniker*, Vol. 3, No. 4, pp. 103–106, April, 1951, in German.

Circuit Protection

Old and small power installations were laid out with due consideration for overload and short-circuit protection against existing fire risks only; thus the protection took mostly the form of fusible and other automatic cut-outs. However, conditions are very different in modern industrial installations, hospitals, department stores, ships, etc., where the continuity of supply ranks nearly equally with that of safety from fire and accident risks. It should also be remembered that modern wiring in itself is a kind of guarantee of a fairly high safety standard, while fusible devices by their very nature tend to be uncontrollable —to a certain extent—there being a smaller margin between high normal current loadings (which are usual in the cases enumerated) and the overcurrents at which they should cut out.

A clear distinction has to be made between consuming devices designed for, and almost as a rule operated at, overloads (such as drives of machine tools) and devices without overload capacity. The latter have an intrinsic load-regulating effect, as they simply refuse to take overloads and thereby inherently protect their own supply system within certain limits.

The problem is thus reduced from its rather vague and evasive overall form to the concrete analysis of the system for overload capacity of its individual parts and, correspondingly, decentralized and individualized circuit protection by the means most appropriate to this specialized task. Carried out in the correct way, it yields the desired result of cutting out in an emergency only the circuit affected without jeopardizing the operation, or service, of devices operated by other circuits.—" The Problem of Line Protection in Modern Installations," U. Hartlieb, *Bulletin*, Ass. Suisse des Electriciens, Vol. 42, pp. 232–236, No. 7, 7th April, 1951, in German.

Earthing Impedance

Earth resistance does not only depend on the kind of soil, shape and dimensions of the earthing electrodes, but also on the kind of electric stresses to which the earthing circuit is subjected. The l.f. and impulse values of the earth resistance are thus different, the latter decreasing with increasing voltage and the impulse resistance curve forming a loop. This tendency is enhanced by using barbed wires as earthing electrodes and also by treating the soil into which the electrode is embedded with charcoal or magnetite for improving the conductivity of the soil, which is of particular importance in countries like Sweden where the ground is often sandy, rocky, or contains clay layers. This article describes

comprehensive tests of the impulse resistance of earthing arrangements consisting of copper earth electrode wires with and without barbs, buried in sand at various depths, with and without surrounding layers of charcoal or magnetite. Charcoal is by far the best material for treating the soil because it is chemically inactive and thus does not corrode the metal electrodes, nor does it form compounds with any other material. It has the added advantage of being light and therefore cheaper in transport. The shape of the earthing electrodes is also important and the barbs or points reduce the impulse value of the earth resistance more the longer they are; greater depth of burying is also an advantage. Although many of the factors influencing earth resistance are not fully known or explained, it seems certain that the treating material is more important for good conductivity of the earth than the shape of the electrode.—" Surge Impedances of Various Earth Electrodes and Earth-treating Materials," H. Norinder and O. Salka, *Bulletin*, Ass. Suisse des Electriciens, Vol. 42, pp. 321–327, No. 10, 19th May, 1951, in German.

Instrument Transformers

While the principles of design of power transformers have remained unchanged for a considerable time, those of instrument transformers still seem to be in a comparatively fluid stage, especially where the methods and materials of insulation are concerned. The interesting features of this development are the use of impregnated paper strips instead of the Bakelized paper cylinders of the power transformers, and the subdivision of the insulation between primary and secondary windings into two halves, each of which absorbs approximately half of the potential difference.

The transition from Bakelized cardboard to impregnated paper represents the replacement of material of a breakdown strength of 100–200 kV/cm by one of 250–400 kV/cm strength and of far more convenient application owing to its nearly " plastic " character, so that it may be " modelled " about the conductors to be protected, following the lines of the field and helping to eliminate dangerous electric stress concentrations. It therefore becomes possible to obtain an insulation mainly stressed for puncture and least for surface discharges. This amounts in practice to applying the design principles of oil cables with impregnated paper insulation to transformers. There is, however, no reason why the development should stop here, in the field of instrument transformers, due as it was to economic considerations more than to any others.

Attempts to transfer these principles to power transformers and to proceed towards a type of high-capacity transformer with insulation based on that of the oil cable have been successful, as demonstrated by the case of two 500,000 kVA, 132/66/2 × 11 kV transformers built for a laboratory for circuit-breaker testing.—" A Particular Type of Transformer with Impregnated Paper Insulation and the Way to Quasi-dry Transformers for High Powers and Voltages," G. Scarpa, *L'Elettrotecnica*, Vol. 28, No. 3, pp. 104–111, 10th–25th March, 1951, in Italian.

Direct Current Transmission

Most of the firms interested in the development of apparatus for high-voltage d.c. transmission have decided on rectifiers having a liquid mercury cathode, only a few having given preference to thyratrons. The latter type—and this also applies to kenotrons—has the disadvantage of a high wear rate of the oxide cathode. Rectifiers of the high-vacuum type have in general a prohibitive voltage drop of about 1,000 V, which raises the problem of dissipating the losses at currents of several hundred amps. High-pressure arc discharge tubes of the Marx type are more favourable in this respect, have a lower voltage drop and better heat dissipation.

Upon the whole, the liquid mercury-cathode rectifier in a metal tank is in the present state of the art the most promising solution of the problem, also for the reason that from its many applications in diverse fields its properties are best known and the design of special models for h.v. transmission is therefore simplified. It is clear that this purpose can be attained only by a series arrangement of such rectifiers—at least for the present—which is facilitated by the fact that the voltage drop per unit never exceeds 20–30 V, whatever the rated voltage. Furthermore, the single-anode model was found most suitable because it affords the designer the greatest liberty in the choice of circuits. In this respect the Graetz three-phase circuit, also known as bridge circuit, has much to recommend

it; for instance, that it requires the lowest transformer rating for equal d.c. output.

Either three-phase or single-phase transformers of the conventional type may be used and a favourable ratio between d.c. voltage and transformer voltage is obtained —a point to be watched at the high voltages concerned. The article gives details of an experimental transmission line section erected by the A.E.G. in 1940 as part of a then projected Elbe–Berlin line for 60 MV at 400 kV. The tests proved the technical possibility of transmission on this principle.—" Rectifiers and Rectifier Circuits for H.V. D.C. Transmission," E. Hubel, *E.u.M.*, Vol. 68, No. 10, pp. 253–259, 15th May, 1951, in German.

Room Heating

Electrical modelling of an unsteady heat flow was first suggested by C. L. Beuken in 1936, who also designed the original model circuits in which the thermal resistance of, say, a wall is represented by an ohmic resistance and its thermal capacitance by a capacitor. The parameters determining heat exchange between parts of buildings and the ambient air are similarly representable. It should be noted that one-dimensional and three-dimensional problems may be represented and solved, great freedom existing in the choice of the time-scale, so that processes actually taking weeks and months may be compressed into minutes in the model process.

The method has been greatly improved and refined lately and its application is described in three examples, concerning the heat requirement and the temperature curve for the same room, once with brickwork walls without and with thermal insulation, and lastly the same room with timber walls. In each of the three examples the two cases treated separately are always that of continuous and that of intermittent heating. The actual saving by intermittent heating and by a suitable type of wall is readily found.—" Investigation of Problems of Room Heating by Electrical Modelling," R. Czepek, *A.S.E. Bulletin*, Vol. 42, pp. 389–398, 2nd June, 1951, in German.

Contact Rectifiers

The contact rectifier developed by Brown Boveri is a means of obtaining a high efficiency of rectification at low voltages, which is of considerable importance, above all, for the chemical industry. The d.c. consuming device is connected with its negative terminal to the star point of the secondary winding of a three-phase transformer and with its positive terminal to three contacts which are connected alternately with the free ends of the secondary phase windings of the transformer.

The contacts are mechanically driven by an asynchronous motor and are closed at the instant of voltage equality between the still connected pole and the oncoming pole of the transformer. The contacts must never be opened under load—the problem being obviously very similar to that of the commutation in d.c. machines, including the short-circuit current occurring during the overlap of the closures of the two successive contacts and opposed to the instantaneous load current. The first contact thus must open at the moment when the a.c. fully compensates the load current. As this cannot be obtained accurately, artificial means, such as controlling chokes and what are called " parallel valves," have to be used for improving commutation. Detailed descriptions of rectifiers of this type are given, among them one for 10,000 A / 250 V with an efficiency of 95·8 per cent.—" The Contact Rectifier," H. Blatter, *A.S.E. Bulletin*, Vol. 42, pp. 238–241, 7th April, 1951, in German.

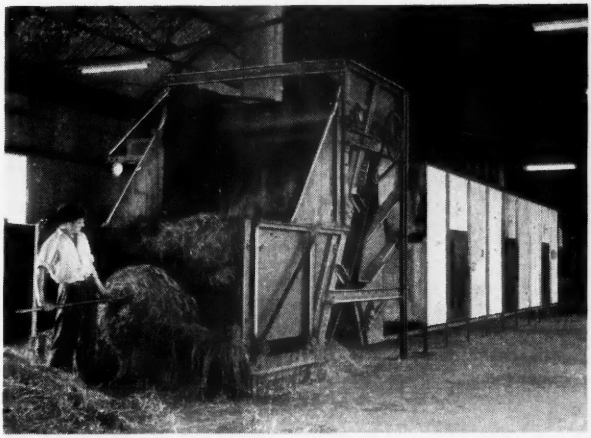
Readers may arrange, by request, to obtain full translations of any of the articles abstracted in this section.—*Eds., Electrical Review.*

Batti-Wallahs' Society

THE influence of sport on the British character formed the subject of an amusing address given by Mr. Oliver Lyttelton at last week's luncheon of the Batti-Wallahs' Society. We gathered that while Mr. Lyttelton considers that sport in moderation is beneficial, too much time is devoted to it in these days to the detriment of general education. Mr. Lyttelton is an old Cambridge golfing " blue " and, in golfing parlance, he thought that we should play 27 holes instead of 36, and use the time now devoted to the remaining nine holes on matters of more serious import.

In accordance with custom there will be no luncheon of the Society in August, the next being held on 26th September.

Loading the grass on to the automatic feeder



Grass Drying

Comprehensive Electrical Installation Near Worcester

ONE of the most comprehensive and conveniently laid out grass drying installations which we have seen is now in full operation at the Worcester Co-operative Society's Brook End Farm, Kempsey. Although coal fired, it embodies many interesting electrical features and accounts for 121 h.p. out of 148 h.p. connected on the farm.

Designed to handle the grass from 350 acres as well as the cereal crops from 250 acres in a wet harvest season, the plant will operate 24 hours a day for five days a week from May until about the end of October. It has a capacity of between 5 and 15 cwt an hour according to the type and moisture content of the grass or cereal being treated. The average moisture content before drying is 75–80 per cent and after drying 10–12 per cent. The protein content of the dried product is 18–26 per cent in the case of grass and 22–26 per cent in the case of lucerne.

To produce one ton of dried grass an average of 9 cwt of coal and 40 kWh of electricity is used, the cost working out at £1 15s and 5s respectively, a total of £2. Only two men are needed to operate the plant.

The grass to be dried is brought in from the farm by tractor and pitchforked on to the automatic feeder of a Petrie & McNaught dryer. The feeder, which is driven by a Crompton Parkinson 3 h.p. motor with an Allen West direct-on starter, takes the form of a metal slat conveyor which carries the grass on to a spiked canvas elevator discharging into the dryer. Variable speed gear controls the rate at which the grass is admitted to the dryer.

The rate of passage through the dryer itself, which is 64ft long, is regulated by further variable speed gear on the main conveyor arranged for four alternative speeds of 6, 7, 9 and 11ft a minute. The dryer has a system of baffles by which the hot air is recirculated and passed through the grass twice before being extracted.

The air is heated by a coal fired furnace fitted with a Joshua Bigwood underfeed stoker driven by a Crompton Parkinson 3 h.p. motor. The furnace is near the centre of the dryer and the hot air from it is drawn into the machine by means of two fans situated one at each end. These fans are both driven at a speed of 3,000 r.p.m. by a Crompton Parkinson 12 h.p. motor (with Allen West manual air-break starter) which also serves the main conveyor through a 500 : 1 reduction gear. An auxiliary extract fan with a 6 h.p. motor is employed for exhausting the air to atmosphere.

The temperature of the dryer is controlled

by a manual regulator which gives the stoker feed any of six speeds. The temperature is shown on a Negretti & Zambra recorder and should it exceed the maximum desired a cut-out would immediately shut off the stoker. A " Satchwell " control with Venner time switch provides for night maintenance. A pilot light indicates when the plant is working and a Chamberlain & Hookham meter keeps an account of the number of hours it is operated.

When it enters the dryer from the furnace the air is at a temperature of 1,000 deg F. Passing through a spark trap it is mixed with cold air admitted through the open top of the fire compartment and cooled to 350 deg F. After circulation and recirculation it is expelled at 125 deg F.

The grass, which is cooled before leaving the machine, is discharged on to a reversible cross conveyor driven by a Hopkinson ½ h.p. motor fitted with M.E.M. starter and reversing switch. Travelling in one direction, this conveyor takes the grass to an inclined elevator (½ h.p. motor) which in turn carries it to an International Harvester Co. type 45T automatic pick-up baler geared down to make ten ram strokes per minute, which is considerably less than normal speed. The baler is operated by a Crompton Parkinson 10 h.p. motor equipped with an Ellison oil-immersed starter.

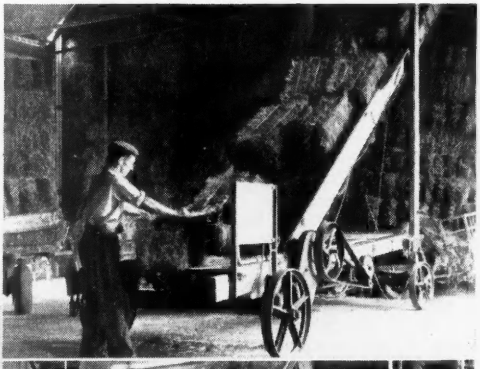
The bales are taken to a storage loft 25ft above ground level by an Ogle hay elevator fitted with a canvas instead of the normal spiked conveyor and converted to electrical operation by fitting an English Electric 6 h.p. motor. Speed of operation has been reduced to about half the normal and the M.E.M. " Auto-Memota " star/delta starter has been arranged with remote push-button stop/start control at the top of the elevator trough.

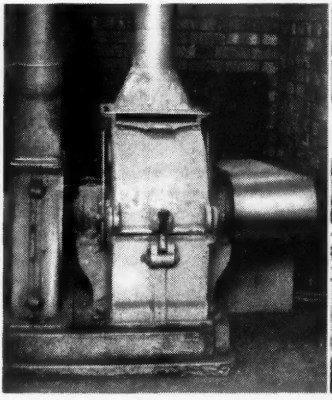
Operating in the reverse direction the cross conveyor takes the grass to a Christy & Norris pre-breaker (L.D.C. 12½ h.p.

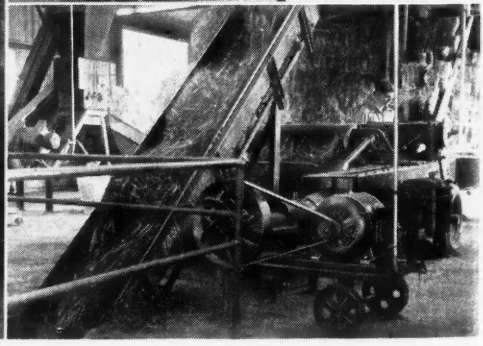
Right : **Bales of grass being carried up the hay elevator to store**

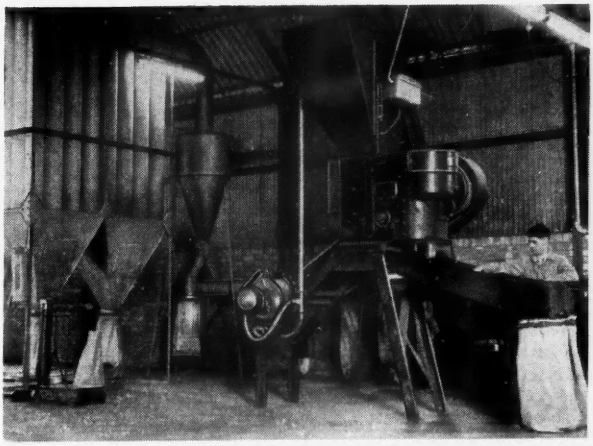
Below : **To eliminate noise and vibration this Christy & Norris hammer mill is in a separate building**

Below Right : **An inclined elevator feeds the automatic baling machine**









Dust extraction equipment, provender press and bagging machines

motor with Allen West star/delta starter) which chops it to 2in lengths. The grass is then sucked by pneumatic conveyor to another Christy & Norris machine, a hammer mill, which to eliminate noise and vibration is in a separate building adjoining the main premises. The 45 h.p. D.C. motor which drives the mill is controlled from the main building by means of an Allen West oil-immersed hand operated starter.

Passed through a $\frac{1}{32}$in screen, the grass is blown back into the main building to a cyclone settler where the fibrous grass falls to the bottom and the dust laden air is taken out of the top to a dust settler. A worm conveyor carries the grass either directly to a Christy & Norris bagging machine (Brook 2 h.p. motor) or, if required for cubes, to an elevator (1 h.p. Brook motor). This elevator takes the grass from a hopper via an interrupted feed to the mixing compartment of a Templewood provender press (20 h.p. Brook motor with E.A.C. hand operated starter) where water is added if necessary. In the press the grass goes to a diehead where it is squeezed out of a tapered tube and cut off by a revolving arm to the required length. The cubes are then put into paper bags.

Fluorescent lighting has been adopted throughout the dryer building, utilizing Crompton Parkinson equipment comprising twelve 4ft batten strips and two 5ft double slotted troughs, the latter being fitted at the intake and output ends of the dryer.

The whole of the installation was carried out by J. C. Baker, Ltd., Worcester.

Railway Improvements

OVER 150 large schemes for the better working of freight traffic are in progress on British Railways, or have recently been authorized and will be carried out as quickly as conditions of labour and materials allow.

The provision of 15 miles of additional sidings, diversion of running lines and the construction of five new signal boxes have been undertaken at Port Talbot, Glam, to cater for additional traffic resulting from the expansion of the works of the Steel Company of Wales, Ltd. The cost of the railway works alone is about £1,100,000. Work is in progress on the doubling of the East Usk branch (3 miles long) at Newport, the provision of loops and sidings and two new signal boxes. The branch serves various factories and the new works are necessary to enable over 2,000,000 tons of coal a year to be conveyed to the B.E.A. power station now under construction near the Uskmouth end of the branch, and to carry increased traffic to and from other industrial works served by the branch. Additional sidings, railhead depots and facilities for coal, iron, steel or power-house traffic are to be provided at Basford (Notts), Rolleston (Notts), Liverpool (Brunswick and Sandon Docks), Scunthorpe, Brentford, etc.

Signalling improvements (including the provision of colour-light signals) planned to give quicker and safer working of trains are to be carried out on a number of sections of line, including the Glasgow Central Low Level Line; between Levenshulme and Stockport (on a particularly busy section of the Manchester–Crewe main line); between Denham and High Wycombe (Bucks); and at Carlisle, Stafford, St. Pancras, Hull (West Parade), Scarborough, Dundee (Tay Bridge).

CORRESPONDENCE

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for the opinions expressed by correspondents.

Peak Load Control

IN his criticism of my article (6th July) Mr. B. Crowsley appears to confirm my statement that by 9.30 a.m. the breakfast time peak has abated and also that the domestic habits of a selected community show little diversity. He mentions two substations which presumably feed two districts and the peak time which he quotes suggests two classes—the earlier peak being artisan and the semi-professional class at a later time. My opening remarks with regard to the necessity for determining the effect of local peaks on the national load curve are also confirmed. Mr. Crowsley gives his opinion that a diversity of only 25 per cent applies to water heaters in his area which makes their removal from the peak even more worth while than I suggest.

The 3 kW heater, as Mr. Crowsley points out, is the load that can be controlled most profitably and as it is usually fitted to a 25-gallon tank it is unlikely that this will be exhausted by normal domestic habits. Should a kettle be used, as he suggests, a saving of 2 kW will still be realized and there will be some measure of uniformity with consumers using a 750 W heater.

It is doubtful whether the water heater load to be restored after peak would equal the space heating shed by people leaving their domestic premises for business, but this would be a matter for investigation to provide the best possible load factor.

With regard to the time taken to manufacture suitable control equipment, it is quite certain that it will be far quicker than manufacturing generating plant and, having regard to the shortage of materials, the former control equipment would be a more adequate solution. The number of control units that could be made from the same quantity of materials as one generating station has yet to be determined, but it may well be that the former is the most economical approach.

In complaining of the suggestion to restrict certain supplies is not Mr. Crowsley's argument in reverse? Have we not now restrictions in the form of complete and expensive power cuts, and is it not my suggestion to maintain continuous supply by a means of control which may not even be felt by the majority of consumers?

Mr. Crowsley's sentiments are a natural and human reaction, but the peak load problem is nothing new. It has been, and will always be, with us and, recognizing this, other countries have controlled certain of their domestic loads for many years. Finally, now may be a suitable time to reconsider the possibilities of a salary scale in the supply industry, based on the product of peak load and load factor, to encourage economic and desirable development.

New Malden, Surrey. W. A. DEVON, *London Area Manager*, VENNER TIME SWITCHES, LTD.

Norwegian Fluorescent Lamps

YOUR report on the proceedings of the International Illumination Commission in Stockholm states in the section headed "Light Sources" (20th July, p. 120) that fluorescent lamps are not manufactured in Norway. This statement happens to be incorrect as one of the Norwegian lamp factories is manufacturing fluorescent lamps in the same range of colours as the British E.L.M.A. firms.

C. T. A. HARPER.

Drammen, Norway.

Office Systems

FOUR papers on office systems published by the Office Management Association as separate illustrated booklets have now been collected in a new omnibus publication entitled "Office Systems," Volume I, price 7s 6d. The papers, each of which comprises a comprehensive survey of the means and methods available to the office manager in connection with the clerical function concerned, are:—"The Application of Planning to Sales Ledger Systems," by V. G. Reid; "Bought Ledger Systems," by A. Bradley; "Stores Control Procedures," by H. H. Norcross; and "Wages Procedures," by A. Abbott. Copies are obtainable from Management House, 8, Hill Street, London, W.1.

Textile Mills in Egypt

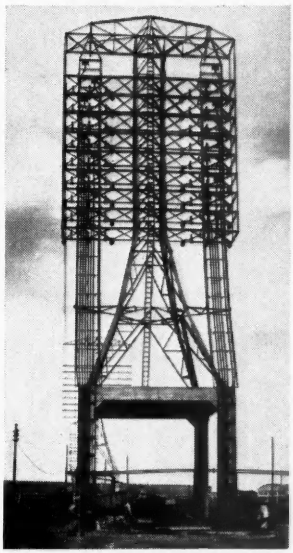
An Unusual Power Distribution System

By J. G. CLEMENTS and R. V. R. WESTON

IT became evident towards the end of the war that the diesel-generators then serving the cotton spinning and weaving mills at Mehalla-el-Kubra in Egypt needed to be replaced. As the mill load had meanwhile grown by about 20 per cent to 8,000 kW, it was decided that the oil engines should be superseded by a steam station. An order was placed by the Société Misr pour la Filature et le Tissage in 1947 with the Metropolitan-Vickers Electrical Co. for four turbo-alternators of 25,000 kW total capacity with all switchgear, control room and auxiliaries and the British Insulated Callender's Construction Co. was asked to design the complete overhead distribution system. The last of the machines was started up in March this year.

Only one of the larger sets is normally in use, the other being a 100 per cent stand-by; the two smaller sets similarly carry the week-end and holiday-period loads. Generation is at 6·6 kV, three-phase, 50 c/s and the turbines are of single-cylinder design. Each of the two larger turbines, directly coupled to an alternator of 10,000 kW at 3,000 r.p.m., passes out 26 tons of steam an hour at 114 lb/sq in and 510 deg F. If the pass-out pressure falls short of requirements, a pressure reducing valve and a de-superheater automatically make up the quantity of low-pressure steam needed in the mills.

Title photo: **Panoramic view of the "A" line from the roof of the power station.** *Below:* **Tower A.1, terminal pick-up, showing the vertical racks carrying cables from the power station to terminal boxes on the tower**



Each of the two smaller turbines is geared, 6,000/1,000 r.p.m., to an alternator of 2,500 kW and exhausts into a condenser. Circulating water for the latter comes from two cooling towers and provision has been made in the piping system for a third tower. Treated water from the River Nile, or from artesian wells, is employed to

make up the cooling tower and boiler feed requirements.

Steam at 500 lb/sq in and 775 deg F is furnished by three John Thompson oil-fired boilers. They are fitted with the M-V system of "unified" control; each set of boiler auxiliaries draws d.c. from a 205 kW motor-generator set. All motor-generators can be interconnected so that any boiler may be powered from any motor-generator set.

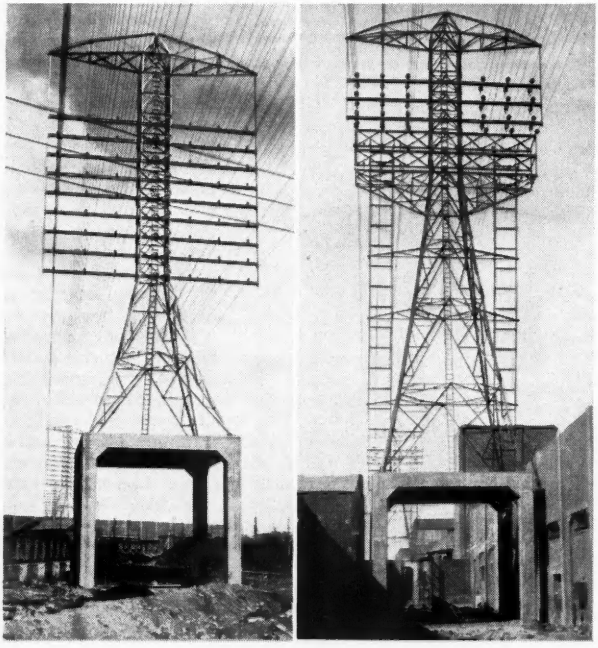
Two 3,000 kVA at 6,600/550 V transformers with twin secondary windings serve the l.v. power house auxiliary circuits, which are controlled by BBO type switchgear. The whole of the internal power cabling was carried out by the M-V Co. The station lighting (supplied from two M-V 200 kVA transformers) and small wiring was by T. Clarke & Co., Sloan Street, London.

The main 6·6 kV switchgear is of the M-V single busbar KOC type with a centre bus-isolator. The latter and incoming switches from the machines are of the K3C type and two additional switches of the same type are provided for interconnection with a future h.v. grid system. All outgoing feeders are duplicated, a complete set feeding from either side of the bus-isolator. The feeders go to a pair of towers, whence overhead distribution lines now replace the old underground cable network. The overhead scheme has the maximum number of conductors ever to be strung from one tower; each of the two initial towers has eighteen three-phase circuits.

To conform with the requirements of the customer and to suit the topography of the works, the overhead distribution system, on steel towers designed by Blaw-Knox, Ltd., is of a most unusual character.

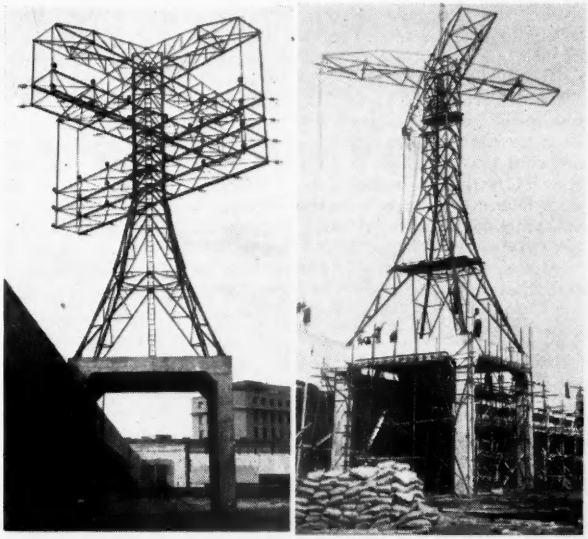
Thirty-six three-phase feeders have been run from the power station at 6·6 kV in two multiple circuit lines (A and B) feeding the various mills, ten substations being installed, one at each tower position. Each line had to accommodate eighteen three-phase circuits and also two earth wires.

Left: **Tower A.2, straight line, conductors on pin-type insulators.** *Right:* **Section and terminal tower with nine conductors dropped, the remainder continuing to the terminal tower A.6 at the end of the line seen in the background**



The greater part of the works area is covered with buildings so the power lines were therefore run over the roadways which criss-cross the whole area of the mills. The towers were built on concrete structures under which the roads provide uninterrupted fairways. Twelve towers were required; each had to be separately considered for its specific duty and only two of them are of similar design. The holding-down bolts for the legs of the towers, which ranged in size from $\frac{7}{8}$ to $2\frac{1}{4}$in diameter and were 6ft long, were set in the

oncrete at each orner of these latforms. They ere embedded in he legs of the plat- rms and bound in ith 4in channel ons fixed horizon- ally. The setting f these bolts in the orrect positions as effected by stub- tting templets in a anner similar to hat used in normal verhead line con- truction. Each ower leg was fitted with a steel foot, fabricated of welded steel plates, for attachment to the holding-down bolts. The weight of these feet varied according to the function of each tower from approx. 100 lb to approx. 450 lb.



Left: **Tower B.4, angle, nine conductors taken off almost at right angles to B.5 tower and twenty-one to B.6 tower.** *Right:* **Tower at B.4 in course of construction**

The rolled steel sections for the towers were ordered from the European Continent and the fabrication throughout was carried out on site under the supervision of the Construction Co.'s engineer. To overcome difficulties caused by delay in the supply of some of the heavier sections of steel, some supplies were obtained from local army disposal dumps. Many of the nuts, bolts and washers required as well as some of the line fittings were also manufactured locally in the workshops of the Société Misr pour la Filature et la Tissage. The steel sections were treated with anti-rust paint and finished in battleship grey.

Overhead line conductors are of 0·05 sq in hard drawn copper, with the exception of five circuits which are of 0·075 sq in section. Each run carries eighteen circuits comprising fifty-four main conductors. In addition two earth wires are carried on the topmost cross-arms and running over the centre point of the conductors on each side of the towers.

The total weight of conductor and earth wire per yard run on the first spans of the "A" circuit is 37·55 lb. The longest span, that between B.1 and B.2, measures 705ft, the total weight of conductors on this span amounting to 7,880 lb. The conductors are unbroken between points A.1 and A.4 and the total length of the three spans of this section is 1,290ft. In all, 83,498 yards of overhead line conductor was supplied for the installation from the Prescot works of British Insulated Callender's Cables, Ltd.

According to their positions and functions the towers were subjected to varying mechanical loads; to illustrate the order of magnitude of the loadings it may be noted that in the case of the heaviest duty towers at terminal and angle positions the loads were as shown in Table I.

TABLE I.—MECHANICAL LOADS ON TOWERS

Tower No.	Overall height	Maximum section used (mm)	Max. comp. load per leg in lb/ult	Max. uplift load per leg in lb/ult
A.1	76′ 6″	200×200 ×22L	382,000	321,000
B.1	76′ 6″	200×200 ×22L	388,000	330,000
B.2	108′ 6″	200×200 ×20L	338,750	316,000
B.4	62′ 6″	150×150 ×16L	202,000	185,000

Porcelain insulators have been used throughout, there being two disc insulators in each tension set, with pin-type insulators on the straight line towers.

At the sending end of the lines paper insulated lead covered cables were run out from the power station and carried up the terminal towers to dividing boxes fixed on the cross-arms. Similarly, the receiving ends of the circuits were taken down into substations in the buildings by means of paper insulated cables.

The site work for this interesting installation was commenced in April, 1950. Local labour was largely employed and on the whole gave very satisfactory service, but there was some difficulty in maintaining progress during the Feast of Ramadan, which occurred at the time when the erection programme was in full swing. During the period of this Festival, which lasts for one month, Mohammedans fast throughout the day.

Nevertheless the work was successfully completed by the appointed time early in January, 1951. The circuits on one of the runs have been put into commission and those on the other are ready for service.

Short Circuit Testing

Series of "ASTA" Publications

IT was to assist the co-ordination of short circuit testing for the certification of British-made switchgear, and other apparatus, that the Association of Short-Circuit Testing Authorities (ASTA) was formed in 1938. In collaboration with electrical manufacturers, the D.S.I.R., the N.P.L. and other technical bodies ASTA has greatly advanced the ways and means of applying tests of this kind. The primary object has been the establishment of common standards of procedure and performance by virtue of which the Association's certificate of rating has become a recognized hall-mark.

The fund of information thus accumulated from twelve years of experience has been drawn upon from time to time for incorporation in booklets published by the Association for the guidance of its members. Those now available are:—"Interpretation of Standard Rules Governing the Short-Circuit Testing and Certification of Oil Circuit-Breakers," 20 pages. "Interpretation of Standard Rules Governing the Short-Circuit Testing and Certification of Low and Medium Voltage Electric Fuses for Alternating Current Circuits," 12 pages. "Rules Governing the Short-Circuit Testing of Circuit-Breakers which are not included, or have features not provided for, in BS.116: 1937 and BS.936: 1940," 12 pages. "Rules Governing the Short-Circuit Testing of High-Voltage Electric Fuses for Alternating Current Circuits," 28 pages. "Rules for the Short-Circuit Testing of Circuit-Breakers in Combination with Back-up Fuses," 16 pages. "Rules for the Short-Circuit Testing of Power Transformers, Current Transformers, Reactors and Resistors," 12 pages.

These documents fall into two categories: (i) interpretations of existing British Standards in relation to the s.c. testing of apparatus to ensure uniformity of test procedure and judgment of performance between test stations; and (ii) rules for the s.c. testing of apparatus not yet covered by a British Standard to ensure uniformity of testing.

All publications are of uniform size ($9\frac{1}{2}$ x $7\frac{1}{4}$) and, in general, each document covers: information required by the testing authority for the purpose of identifying the apparatus to be tested; the information and results to be recorded by the testing authority; permitted deviations from the strict requirements of the appropriate specification(s) as may be necessitated by the test plant limitations; and assessment of performance as judged by the behaviour of the apparatus during test and its condition after test.

The "Rules" also include fundamental terms, method of rating and criteria of severity. The "Rules" for apparatus not covered by BSS are not final and will be subject to revision when relevant Standards are issued. The "Interpretations" in no way modify or conflict with any British Standard, but amplify such points as cannot, of necessity, be covered by a general standard specification.

Copies of these publications are available on application to the secretary, Association of Short-Circuit Testing Authorities (ASTA), 36. Kingsway, London, W.C.2, price 5s each post free.

Private Generating Plant

BECAUSE of the length of time which must elapse before the gap between the demand for and supply of electricity is closed, the North Midland Regional Board for Industry at Nottingham last week adopted a resolution urging that every encouragement, particularly by additional allowances for depreciation, should be given to industry to install private generating plant.

PERSONAL and SOCIAL

News of Men and Women of the Industry

THE Railway Executive announces that, with the concurrence of the British Transport Commission, the following appointments have been made :—

Mr. J. F. Harrison, mechanical and electrical engineer, Eastern and North Eastern Regions, Doncaster, to be mechanical and electrical engineer, London Midland Region, Derby; **Mr. K. J. Cook,** mechanical and electrical engineer, Western Region, Swindon, to be mechanical and electrical engineer, Eastern and North Eastern Regions, Doncaster; and **Mr. R. A. Smeddle,** deputy mechanical and electrical engineer, Southern Region, Brighton, to be mechanical and electrical engineer, Western Region, Swindon.

Mr. G. H. Dale, district engineer at South Shields for the North Eastern Electricity Board, is to retire. Mr. Dale joined the former South Shields Corporation Electricity Department in 1920 and was borough electrical engineer when the undertaking was nationalized. For a time he acted as executive officer at South Shields.

The English Electric Co., Ltd., announces that **Sir John H. Woods,** G.C.B., M.V.O., Permanent Secretary to the Board of Trade since 1945, is shortly taking up an appointment with the group. Sir John has been in the Civil Service for over thirty years, entering the Treasury as assistant principal in 1920. He has been Secretary to the Trade Facilities Act Advisory Committee, Principal Private Secretary to the Chancellor of the Exchequer, and a Principal Assistant Secretary in the Treasury from 1940-43. From 1943 to 1945 he was Permanent Secretary to the Ministry of Production.

Sir John H. Woods

The Micanite & Insulators Co., Ltd., has appointed **Sir Arthur P. M. Fleming,** C.B.E., D.Eng., M.I.E.E., a director for the past twenty-two years, as deputy chairman of the company. **Mr. H. A. Cooper,** F.C.I.S., for many years secretary and for the past six years secretary and manager, has been appointed general manager, and **Mr. F. L. Heeton,** F.C.I.S., A.A.C.C.A., for the past two years acting secretary, succeeds Mr. Cooper as secretary.

Mr. A. H. Marsh, A.M.I.E.E., senior assistant engineer (construction) of the South East Scotland Division of the British Electricity Authority, has been appointed generation engineer (construction) of the Division in succession to **Mr. J. Hagen,** A.M.I.E.E., who retired at the beginning of July. The appointment is effective from 11th July. Mr. Marsh received his technical education at the Leeds College of Technology and his early training with Greenwood & Batley, Ltd., Leeds, and with the City of Leeds Electricity Department. He was senior draughtsman and technical assistant in the construction department of the Leeds Electricity Department when, in 1943, he joined the staff of Kennedy & Donkin, consulting engineers. For the two years before joining the British Electricity Authority in 1949 as senior assistant engineer (construction) Mr. Marsh was the resident engineer for Kennedy & Donkin on the Portobello power station reconstruction.

Mr. A. H. Marsh

Mr. J. B. Scott, D.F.C., Associate I.E.E., general sales manager of the Plant Division of Crompton Parkinson, Ltd., has been appointed an executive director of the company; in addition he will take up a new appointment as assistant sales director (home) as from 1st October next. As from that date **Mr. C. A. J. Martin,** G.C., M.C., B.A., A.M.I.E.E., M.Inst.R., will become general sales manager, Plant Division, and his present position of product sales manager, f.h.p. motors, will be taken over by **Mr. R. V. Powditch,** O.B.E., T.D., A.M.I.E.E., A.I.Mech.E., who is at the present time product sales manager, Nelson stud welding.

Mr. Scott joined Crompton Parkinson in 1939 as a plant sales engineer, later enlisted in the R.A.F. and won the D.F.C. twice. In February, 1946, he was made manager of

the Manchester plant branch and a year later branch manager, London office. He was promoted to general sales manager, Plant Division, in 1948.

Mr. P. F. Soper, B.Sc.(Eng.), Ph.D., M.I.E.E., at present head of the Electrical Engineering Department of the Nottingham & District Technical College, has been appointed head of the Electrical Engineering Department of the Northampton Polytechnic, London, E.C.1, in succession to Dr. J. S. Tait, who, as we have already reported, has been appointed principal at Woolwich Polytechnic. Dr. Soper was educated at Margate College, Brighton Grammar School, and Queen Mary College (University of London), and served a college apprenticeship with the Metropolitan-Vickers Electrical Co., Ltd. In 1935 he was appointed technical assistant with the Morgan Crucible Co., Ltd., and in the following year became lecturer in electrical engineering at the County Technical College, Worksop. In 1938 he took up the position of lecturer in charge of electrical engineering at Lincoln Technical College, and in 1944 became head of the Electrical Engineering Department at Doncaster Technical College. He took up his present position in January, 1949. Dr. Soper was a Committee member of the Sheffield Sub-Centre of the Institution of Electrical Engineers from 1947 to 1949, was a David Hughes Scholar (1929), and received the 1851 Industrial Bursary (1930-32).

Dr. P. F. Soper

E. K. Cole, Ltd., announce that **Mr. B. E. Terry,** A.M.I.Mech.E., A.M.I.P.E., has joined the Plastics Division at Southend as technical manager, in which capacity he will control all the technical sections of the Division. After early training and experience with the British Xylonite Co. and the L.N.E.R., Mr. Terry became toolroom foreman at the M.O.S. shell factory, Dukinfield. After this he was engaged for a time on the design of security equipment and machine tools in a War Office experimental station before joining British Moulded Plastics, Ltd. Mr. Terry has been with B.M.P. for the last eight years, first as chief of planning and later as head of the Development Division.

Mr. B. E. Terry

Mr. Percy Tonks and **Mr. F. Dudley Felton** have been appointed joint managing directors of the Revo Electric Co., Ltd., following the death of the late managing director, Mr. Albert E. Felton.

Relatives and friends of employees of **Johnson & Phillips, Ltd.,** were invited as guests of the directors to their " open days " on 18th and 19th July at Charlton. Parties were conducted by stewards to the various departments where they inspected the production of rubber and paper insulated cables, transformer products, impulse plant used for testing transformers, the cutting of plates by oxy-acetylene plant, and the overhauling and reconditioning of the works plant. The afternoon concluded with a display of domestic appliances, products of British National Electrics, Ltd., a subsidiary company. The guests were welcomed by Mr. W. Glass, joint managing director, and each received a copy of " The Story of J. & P.", and a photograph of their own conducted party.

Mr. E. Page

Mr. E. Page, who has been East Midland area representative of Berry's Electric, Ltd., since 1946, has been appointed manager of the company's Birmingham branch. **Mr. F. Duckham** has taken over control of the Manchester branch.

Sir Frederick Leith-Ross and **M. Jean Louis** have been elected directors of Babcock & Wilcox, Ltd. M. Louis is president of Société Française des Constructions Babcock & Wilcox, Paris.

The Merseyside and North Wales Area Final of the National Golf Competition of the **Electrical Industries Benevolent Association** will take place at Heswall Golf Club on 4th September next. For this event there is the Brittain Bowl for the winner, and other donated prizes for the runner-up and winners of the greensome competition to be played during the afternoon. Qualifying score cards (2s 6d each), should be returned to Mr. S. R. Gee, 29, Hope Street, Liverpool 1, not later than 14th August.

The summer issue of " Helecs News," the house journal of Hindle, Smart & Co., Ltd., of Euston Road, London, W.C.1., celebrates the completion of twenty-two years' partnership of **Mr. N. Hindle,** managing director, and **Mr. R. E. Smart,** director.

Mr. F. N. Prangnell, of A. Reyrolle & Co., Ltd., who has recently been in this country on leave and to take a refresher course at the works, has now returned to his headquarters at 12, Mission Row, Calcutta, where he is taking over the representation of Reyrolle's for India, Pakistan, Burma and Ceylon.

Mr. A. J. Beanland, B.Sc.Tech., A.M.I.E.E., A.M.I.P.E., has been appointed assistant general manager of the Trafford Park works of Lancashire Dynamo and Crypto (Mfg.), Ltd., as from 1st September next. Mr. Beanland received his engineering education at the Manchester College of Technology, graduating in electrical engineering in 1932. He then took an apprenticeship course with Lancashire Dynamo & Crypto, Ltd., and has since been in the continuous employment of the company. His latter appointments have been as district sales manager in Leeds and manager of the L.D.C. fractional horse power motor factory.

Mr. A. J. Beanland

Mr. G. R. Peterson, B.A., M.I.E.E., technical executive assistant to Sir John Hacking, M.I.E.E., deputy chairman (operations) of the British Electricity Authority, has been appointed generation operation engineer in the Chief Engineer's Department of the Authority. He succeeds **Mr. J. A. Vice,** O.B.E., A.M.I.E.E., who retired a few weeks ago.

Mr. Peterson is a graduate of Clare College, Cambridge, and had a varied training experience in Britain before going to the United States, where he spent fifteen months with the American General Electric Co. He then joined the Metropolitan-Vickers Electrical Co. and was engaged on power station work in the London area before his appointment by the Central Electricity Board as an assistant in the operation department of the North East England Area. Having been transferred to the head office of the C.E.B. in 1942, he was seconded in the following year to the Ministry of Economic Warfare in connection with electricity supply in Germany and the occupied countries. In 1944, Mr. Peterson rejoined the C.E.B. in London as chief assistant operation engineer, and two years later was appointed operation engineer for the North West England and North Wales Area. Upon the establishment of the B.E.A. in 1948, he was appointed overseas liaison engineer and personal assistant to Sir John Hacking, to whom he later became technical executive assistant.

At a recent farewell ceremony Mr. Vice was presented by Lord Citrine with a cheque (for the purchase of a refrigerator) to which his many friends in the Authority's service had subscribed. The ceremony was attended by the fourteen divisional controllers who were in London for a conference, the staff of the generation operation branch and numerous colleagues. The chief generation engineers of all the Divisions, at their June meeting, presented Mr. Vice with their own farewell gift—a gold wrist watch.

Mr. Vice received his engineering training at Leicester Technical College and with the Lancashire Dynamo & Motor Co., Ltd. Later he served with the Gravesend, Ilford and Manchester Electricity Departments. In 1924 he went to the County of London Electric Supply Co. as resident engineer at Barking power station, and ten years later became generation engineer in charge of the Barking and Littlebrook power stations and the power stations of the County Co.'s associated companies. He was appointed technical adviser to the company in 1945 and was serving in this capacity when the B.E.A. was set up and he received the appointment he has now relinquished.

OBITUARY

Mr. H. W. Harris, regional manager of Philips Electrical, Ltd., for the Manchester area, died on 29th June while on holiday in Wales. He was fifty-eight. Mr. Harris, who had been in Manchester for eighteen months, was best known in Yorkshire where he had been manager of Philips' Leeds branch for many years before moving to Manchester.

Mr. Sidney Probert, works and technical director of Aberdare Cables Africa, Ltd., Port Elizabeth, died suddenly on 2nd June at his home in Port Elizabeth, at the age of forty-four. Mr. Probert joined the staff of Aberdare Cables, Glamorgan, fourteen years ago, was appointed chief technical engineer of Aberdare Cables in 1946, and last year was appointed to the board of directors.

WILLS

Mr. J. Joseph, C.B.E., M.I.E.E., a director of Aeronautical & General Instruments, Ltd., who died on 4th November last, left £10,734 gross (£10,577 net).

Mr. C. W. Jackson, M.I.E.E., late senior executive officer at King's Lynn to the Eastern Electricity Board, who died on 28th January last, left £1,847 gross (£1,798 net).

Mr. R. G. Hosking, who was associated with the British Thomson-Houston Co., Ltd., and died on 5th May, left £68,634 gross (£65,153 net).

Industry and the House

Attempts to Counter Inflation

By F. J. ERROLL, M.A., A.M.I.E.E., M.P.

INTEREST in the Commons rearmament debate on 23rd July had been largely evaporated by concern and speculation over the statement which the Chancellor of the Exchequer was to make on Thursday last week. This debate therefore passed off quietly with Mr. Strauss cautiously outlining a certain amount of achievement.

The House and the country also had been well warned in advance by the Treasury's public relations department that Mr. Gaitskell's statement would be extremely serious. At the last moment they relented and newspapers were encouraged to say that it would not be quite as bad as had been feared. Mr. Gaitskell began with a survey of our overseas economic position. Because of rapidly rising commodity prices we were experiencing an adverse balance of trade and once again we would have to review our imports. The deficit was not only a dollar deficit; the United Kingdom was also in deficit with the sterling area as a whole.

The review of the dollar import programme would be carried out so as to reduce expenditure wherever that could be done without damage to Britain's long-term interests. At the same time dollar exports must be increased and the Government looked to industry to assist and where possible increase its effort towards that objective.

Commodity Prices

Because of the considerable rise in prices the total cost of imports this year would prove to be well over £100 million more than the Economic Survey allowed for. He was hoping for a greater measure of stability in world commodity prices. A sharp rise or fall in world prices must have serious economic consequences and the Government believed that the situation could be dealt with only by international agreement. Already there had been good results from the International Materials Conference.

The Chancellor then turned to inflation at home. He said that he hoped to prevent prices from rising still further by introducing a long list of new price controls. These controls would inevitably operate on the cost-plus system which had been rightly condemned in the past as leading to extravagance, but he hoped to provide for two price "ceilings." Manufacturers who chose to operate below the lower ceiling would not be subject to cost investigations; they would be free to choose whichever ceiling they preferred.

Control of Dividends

Mr. Gaitskell then turned to the most controversial part of his statement. He said that the daily incidence of dividend increases was bound to act as an irritant on the great majority of the population who were not equity shareholders. The psychological consequences of sharp increases in dividends were, in his opinion, far greater than their direct monetary effect. He did not think that claims for higher wages and higher salaries could be kept within moderation in the face of such increases. Accordingly the Government had decided that dividends must be limited forthwith. The control would apply to all companies, both public and private, and in normal cases the limit of distribution would be the average of the dividends distributed in respect of the last two accounting periods of the company for which before 27th July, 1951, a final dividend had been paid or declared or announced. (A White Paper has since been issued giving some more details of the way in which the control is to be exercised but it leaves many important questions unanswered.)

In conclusion the Chancellor said that recent increases in wages had clearly outdistanced any increase in productivity and therefore contributed to the rise in costs and prices. He therefore hoped that there would be reasonable restraint in the field of wages.

Mr. Oliver Lyttelton made the first

statement on behalf of the Opposition. In his view the Chancellor's statement showed that to re-arm on a sufficient scale to be safe, to export on a scale to be solvent, to consume on a scale to be comfortable, and to maintain the social services was beyond us as a nation on the basis of the present scale of working hours and productivity. The dilemma remained unsolved and inflation had begun to gallop. He did not think that the Government's measures would have very much effect in countering the pressure of inflation. They were " counter-irritants and smoke-screens," to disguise the Government's failure.

Dealing specifically with the Government's intention to control dividends, he showed that in the three years 1947–1950 dividends had increased by £3 million. Wages during the same period had risen by £940 million. A comparison of the dividends paid by 703 industrial companies during the first six months of 1950 and the first six months of 1951 showed that dividends had risen about 10 per cent. During the year the capital employed by these companies had increased by 16 per cent. The dividend increases were minute compared with the increase which had taken place in wages and could have but little effect upon inflation.

The House rose yesterday for the Summer Recess and Members are still speculating on the possibility—indeed the likelihood—of an October election. The Chancellor's statement has done little to clear up any of these speculations. By some his proposals are regarded as plain electioneering not intended to be put into practice. Others point out that he said that the Government would introduce a Bill for the purpose in the autumn and it will presumably attend to this when the House reassembles on 15th October.

PARLIAMENTARY NEWS

From Our Special Reporter

IN the House of Commons last week Lieutenant-Commander Clark Hutchison asked the Secretary of State for Scotland whether he had received any report by the Amenity Committee in regard to Constructional Scheme No. 25 (the Breadalbane project) of the North of Scotland Hydro-Electric Board.

Mr. McNeil said that he had received from the North of Scotland Board a copy of the recommendations made by the Amenity Committee on the Breadalbane scheme, together with the Board's observations upon them. In reply to a further question he said he did not think it would be quite proper for him to comment on the report at this stage. It was bound to be published because if there were objections to the scheme it would have to be made available at the inquiry and if there were no objections the recommendations in the report would be published as part of the White Paper which would accompany the scheme on its presentation to the House. While the Committee made many recommendations—many of them, in his opinion, very good ones—they did, of course, accept the scheme.

North Wales Schemes

Mr. Vosper asked the Minister of Local Government and Planning if he had yet received a report from the National Parks Commission on the investigations of its sub-committee into the proposed hydro-electric schemes in North Wales, and whether the report would be published.

Mr. Lindgren said that the Minister had received a copy of the representations which the Commission had made to the Minister of Fuel and Power. No doubt the Commission would include these representations in its annual report.

Radio Apparatus Precautions

Lieut. Col. Lipton asked the Home Secretary whether he would report the result of his consultation with the manufacturers of radio and television sets for revising the present safety precautions.

Mr. Ede said he understood that a new British Standard specification for television sets, which included revised safety precautions drawn up in the light of recent experience, was nearing completion and would be published as soon as possible.

He added that the risk of fire and shock from electrical appliances was one of the matters which had engaged the attention of the Inter-Departmental Committee on Accidents in the Home, and consultations had taken place and would continue to take place with manufacturers in regard to safety precautions. The

number of fatalities that had occurred was surprisingly small; with regard to television the number was still below double figures.

Sulphur Imports

Wing Commander Bullus asked the Lord Privy Seal what tonnage of sulphur over and above the United States allocation had been acquired by his department.

Mr. Stokes said that there had been no imports of sulphur on Government account this year other than from the United States. All other purchases in the first six months of the year were on private account.

V.H.F. Communication

Replying to Mr. Kerr, the Postmaster-General (Mr. Ness Edwards) said that the Post Office had been asked by the United States authorities to reconsider, in the interests of world standardization, its decision that amplitude modulation should be used for single-channel v.h.f. maritime radio services in the United Kingdom. Discussions with United States representatives had not yet taken place but he proposed to support the case for amplitude modulation in any international discussions.

Mr. C. I. Orr-Ewing asked the Postmaster-General what was the composition of the special scientific committee which had been examining the problem of very high frequency.

Mr. Ness Edwards said he was advised by members of his Department who had been examining the problems connected with v.h.f. communications.

Power Cuts

The Minister of Fuel and Power (Mr. Noel-Baker) gave Mr. Lionel Heald figures showing that power cuts during the months of April, May and June had risen in number very considerably between 1949 and this year. He said that information about the duration of these power cuts was not readily available, and, as the duration varied from one district to another, it could not be obtained without an unjustifiable expenditure of time and labour.

B.E.A.'s Capital Expenditure

Mr. Black asked the Minister of Fuel and Power what was the aggregate amount which the British Electricity Authority submitted to him as necessary to be spent in the current year on capital works to maintain its services and to meet the expanding demand for electricity; and what was the aggregate amount which the Government was prepared to sanction.

Mr. Noel-Baker said that the Government was in close consultation with the B.E.A. and it was hoped to invest as much on capital works as could be usefully invested in the industry without detriment to other essential demands on goods and services. A total aggregate figure had not been fixed as yet for this year.

Technical Personnel Committee

IN a written answer to a question in the House of Commons on 26th July Mr. Alfred Robens, Minister of Labour and National Service, said that it had been decided to reconstitute the Technical Personnel Committee. Lord Hankey has agreed to serve as chairman of the reconstituted Committee, the members of which are as follows:—

Members nominated by the Federation of British Industries: Sir Arthur Fleming, C.B.E., D.Eng., M.Sc., F.C.G.I.; Sir Wallace Akers, C.B.E., F.R.I.C., Hon.D.Sc.; and Captain A. M. Holbein, C.B.E., F.C.G.I. Representative of the universities: Sir Edward Appleton, G.B.E., K.C.B., F.R.S. Chairman of the University Grants Committee: Sir Arthur Trueman, F.R.S., D.Sc. (Lond.). Member representative of science (nominated by Lord President): Professor S. Zuckerman, C.B., F.R.S. Treasury: Mr. S. L. Lees. Foreign Office: Mr. E. A. Berthoud, C.M.G. Colonial Office: Mr. R. A. Whittle, M.C. Board of Trade: Mr. S. A. Dakin. Commonwealth Relations Office: Mr. A. C. B. Symon, C.M.G., O.B.E. Ministry of Labour: Mr. H. M. D. Parker, C.B.E. Ministry of Supply: Mr. W. D. Wilkinson, C.B., C.B.E., D.S.O., M.C. Lord President's Office: Mr. E. D. T. Jourdain. The secretary will be Mr. A. J. S. James, Ministry of Labour and National Service.

The terms of reference are: (1) To consider, make recommendations and deal with questions relating to the home and overseas demand for the available supply of scientific and technical personnel of professional or approximately professional standards, including the making of recommendations on its economic use and the need for increasing the available supply. (2) In connection with the overseas demand for such personnel:—(*a*) To make recommendations upon appropriate steps to promote the recruitment from the United Kingdom of persons required to assist the economic development of under-developed countries. (*b*) To consider any special steps which are required to provide opportunities for training in the United Kingdom of persons from under-developed countries.

The Committee will be empowered to invite representatives from other Government Departments or outside interests to be present when matters of concern to them are being discussed.

A.E.I. and Siemens Stock

THE Board of Trade has announced that after full consideration of tenders submitted for the purchase of stock in Siemens Bros. & Co., Ltd., now vested in the Custodian of Enemy Property, it has decided to accept the offer of Associated Electrical Industries, Ltd.

Commerce and Industry

Next Year's British Industries Fair

Salary Increases for Electricity Staffs

WITH one-third of the available space in the London sections sold and the rate of bookings at Birmingham slightly up on last year, the organizers of the 1952 British Industries Fair, to be held from 5th to 16th May, are confident that the sixth Fair since the war will compare with the best in the postwar period. There has been a tendency in many quarters to assume that the 1951 B.I.F. in Festival Year would represent the Fair's peak achievement, after which a sharp decline in size, representation and influence could be expected. The rate at which demands for space are coming in, and the variety of industries involved, do not support this theory. Intending exhibitors in London are advised that if their applications for space are not received by the closing date, 25th August, they may have to be placed on the waiting lists. There is no set date for receiving applications at Castle Bromwich and the flow of exhibitors' demands is normally maintained at an even pressure until the end of the year.

Electricity Staffs' Salaries

The Electricity Supply Industry National Joint Council (Administrative and Clerical Grades) at its meeting on 17th July reached agreement on salary increases for staff on the general clerical scale, shorthand and typing grades, machine operators and telephone operators. The new rates apply from 1st June, 1951. The general clerical new scale is split into two classes—Class A from £150 per annum at age 16 to £355 per annum at age 26, and Class B, commencing at £375 and progressing by annual increments of £20, £15 and £20, to £430 per annum. Progress from Class A to Class B will be subject to a certificate of capability. The settlement arose from a staff side application for an increase in all scales of not less than 20 per cent to compensate for the increased cost of living. It has not been possible to reach agreement in respect of the higher clerical, administrative and commercial staff and that part of the claim has been referred to the Industrial Court. It has, however, been agreed that any award shall apply from 1st June.

"Daylight on Industry" Exhibition

At the "Daylight on Industry" Exhibition, Liverpool, the Telecommunications Pavilion is occupied by a comprehensive exhibit by the Automatic Telephone & Electric Co., Ltd., incorporating a full size working model of a telephone exchange. A tape recorded commentary, synchronized with the movement of the mechanisms, describes through a loudspeaker what takes place. Mine telephone and signalling equipment is also included in the Merseyside and North Wales Electricity Board building. In addition, two of the company's products, "Rythmatic" ripple control and remote control equipment, are shown in the B.E.A. Pavilion.

British Insulated Callender's Cables, Ltd., have on view a 40ft pylon and in the Metals Pavilion a range of products including high

Re-equipped and redecorated showrooms of Electrical Components, Ltd., Brighton

voltage cables, claw-type cable cleating system and wiring systems. The selection from the company's ranges of cables includes the single core type for 275 kV and 66 kV operation, the three core for 132 kV and two 33 kV cables, one sheathed in lead and the other in aluminium. Use is made of three screens on which to project photographs of the company's products.

The Merseyside and North Wales Electricity Board displays models of power station plant and diagrammatic exhibits of the construction of a power station. The Electricity Pavilion includes the grouped exhibits of the B.E.A., the Electricity Board, the English Electric Co., Ltd., and Brookhirst Switchgear, Ltd.

A representative selection of Marconi Marine products is arranged in the form of a typical ship's wireless room.

The exhibition, which is being held on a cleared site adjoining Lord Street, closes on 11th August.

Heavy Duty Cooking Apparatus

In our issue of 20th July (p. 146) we published some notes on the trading code of certain manufacturers of heavy duty cooking apparatus. We are asked to emphasize that this code applies only to *electric* heavy duty equipment. Some of the manufacturers concerned also produce other types.

Large Stator for Ontario

In our last week's issue we referred to the shipment of a large stator, dispatched from the Stafford works of the English Electric Co., Ltd., for the J. Clark Keith generating station at Windsor, Ontario. The accompanying picture shows the stator being loaded on to S.S. *Assyria*, at Sandon Dock, Liverpool.

A large English Electric stator being shipped to Ontario

Iron and Steel Returns

The Minister of Supply has made the Iron & Steel Utilization (Information) Order, 1951, calling for returns of iron and steel consumed during the first half of 1951, corresponding stocks, and estimated requirements for the following nine months. The object is to collect information on which the allocation of steel can be based. Allocation schemes will be introduced as soon as possible for alloy steel and for all other steel—including sheet steel and tinplate, which are already allocated. Copies of the Order are obtainable from H.M. Stationery Office.

Fair Trading Policy

The following amendments to the Fair Trading Policy, Edition 4, have recently been agreed by the Electrical Fair Trading Council: *echedule 5* (heating, cooking and domestic *S*lectrical appliances).—Cookers, other than domestic and breakfast types, hot-plates other than domestic and urns above 6 gall (Category 4 of this schedule) will be deleted from future editions of the Policy. The control of these products is now considered as coming within the catering equipment industry whose distribution outlets vary considerably from those outlined in the Fair Trading Policy. *Schedule 10* (synchronous clocks).—The dial size of clocks within the scope of this schedule has now been limited to 18in diameter instead of 24in as at present.

Contracting Industry Decisions

At its meeting on 13th July, the National Joint Industrial Council for the Electrical Contracting Industry agreed that from 3rd September next the amount of country allowance shall be increased from 5s 6d to 6s per night. At the same meeting it was also agreed to increase the minimum charge hands' rate from 2½d to 3d per hour from 13th August next.

Change of Address

The International Electrical Association, Ltd., has removed to Bush House (North-West Wing), Aldwych, London, W.C.2 (telephone : Temple Bar 0801).

Radio Exports

British radio exports in the first six months of 1951 were valued at £10,195,333, 39·4 per cent more than for the corresponding period last year, an all-time record and five times the value of a whole year's exports before the war. These figures, based on Customs returns and issued by the Radio Industry Council, show that the biggest increase was in the export of radio receivers which rose by 74 per cent to £2,110,824. Receiver manufacturers were able to expand their markets in almost all countries.

They were particularly successful in South Africa, South America, Egypt and Malaya, and some have even broken into the American market. Components were exported to the value of £3,387,892, approximately 10 per cent going to the United States and Canada. Exports of valves rose by 54 per cent to £1,817,171 and of capital equipment (broadcast transmitters, communications equipment, navigational aids, etc., not including that installed in ships and aircraft) by 12·6 per cent to £2,646,618. The British Commonwealth took about 40 per cent of the total radio exports which now form the highest single group among exports of the British electrical industry.

Motors for the United States

Part of the first consignment of one of the largest dollar orders ever placed for British small electric motors was dispatched from the Cardiff works of the Hopkinson Electric Co., Ltd., on 25th July. The total value of the order exceeds $500,000 and is for 6,000 motors of 1-7½ h.p., to be used for pumping water to farms and rural houses in the United States. Another order valued at £45,000, which the factory is at present working on, is for larger motors of 12–15 h.p., for India. These motors have been specially designed for use in the India "tube wells" irrigation scheme.

Changes in Export Licensing

The Board of Trade announces alterations, as from 1st August, in the export licensing regulations. Among the goods added to the list for which licences will be required for export to any country other than the Commonwealth (excluding Hong Kong), Irish Republic and the United States are dynamometers and certain types of furnaces. Goods for which in future licences will not be required for export include electrical laminations. The new Order is the Export of Goods (Control) (Amendment No. 2) Order, 1951, amending S.I. 1951 No. 1053 as already amended by S.I. 1951 No. 1060.

Diesel Engine Industry

Some interesting figures regarding exports of Brush Aboe diesel engines and suggestions for bridging the power gap at home were given by Mr. A. P. Good (managing director of the Brush Aboe group of companies) at a Press conference last week.

Mr. Good denied a report published in the United States recently that the group had suspended civilian sales because of pressure of the rearmament programme. He said that export orders over the past few months had set up an all-time record for the group; orders for the first six months of the year were valued at just under £16 million, compared with just over £11 million for the whole of 1950. Their Engines Division contributed £2·1 million of the increase of £3·2 million of diesel engine exports made by British industry for 1949–50.

Three new overseas orders placed with Brush Aboe were a £500,000 order for electrical equipment for fifteen power stations in Argentina, a £250,000 order for Mirrlees diesel engined generating sets for the Electricity Commission of New South Wales, and a $1½ million order for diesel generating sets, placed by the Canadian Department of National Defence with the Vivian Diesel Engine Works of Vancouver, in which the group recently obtained a controlling interest.

Speaking of the power gap at home Mr. Good said it would be a great advantage if industry was encouraged to install diesels for running plants in factories to relieve the heavy burden on grid supplies. While the authorities had extended the period before which industry would be restricted in installing its own plant to about eight years, he thought the Government should do away with restrictions altogether and arrange some form of subsidy as an incentive to manufacturers to install their own plant. While the export order book of their group was larger than ever before, he was confident it could also meet an increased home demand.

Trade Announcements

Matterson, Ltd., Rochdale, makers of gearboxes, electric hoists and overhead travelling cranes, have transferred their Midland representation to the Barnol Engineering Co., Ltd., of 83, Newhall Street, Birmingham, 3 (telephone, Central 2760), a new associate company of Inspecting Engineers, Ltd., who have been Matterson's technical representatives for some years.

The **Light & Power Accessories Co., Ltd.**, has moved to Wellesley Works, Wellesley Road, Wood Green, London, N.22.

The telephone number of **Stewart Transformers, Ltd.**, is now Ladbroke 3120.

Catalogues and Lists

Metropolitan-Vickers Electrical Co., Ltd., Trafford Park, Manchester, 17.—Ten technical publications dealing respectively with a.c. direct-on contactor starters, electro-hydraulic thrustors, induction motors, commutator motors, control push-buttons, d.c. contactor starters, mining contactors, flameproof switchgear, hydrogen coolers for turbo-generators and vacuum pumping equipment.

Duncan Low, Ltd., 299, Bell Street, Glasgow, C.4.—Six catalogues on immersion heaters and flameproof and industrial heating equipment.

"Diamond H" Switches, Ltd., Gunnersbury Avenue, London, W.4.—Three folders on heater switches, oven thermostats and toggle switches and neon indicators.

ELECTRICITY SUPPLY

Winter Economy Plans Discussed

Load Position in the Midlands

REPRESENTATIVES of industrial, commercial and domestic users of electricity last week met the Minister of Fuel and Power at the Ministry to discuss means to be taken to secure the utmost economy in the use of electricity at peak periods during the coming winter. Factories and large commercial firms will next winter, as in the past, be required to spread their load by various means such as transferring certain operations from peak to off-peak hours. It is not possible, however, to organize load spreading in the same way among domestic users, hotels, shops and offices and the conference was invited to discuss what additional steps should be taken.

It was agreed that a most effective way of keeping in touch with the small user of electricity would be to set up Regional Committees with the organizations represented at the meeting and others, the Electricity Boards and Regional Boards for Industry. The function of these committees will be to keep the peak load problem before the public and to enlist the co-operation of the Press and the public. Peak publicity by means of advertisements will continue, as before, to be the responsibility of the Electricity Boards. It is hoped that the Regional Committees will begin to function by the end of September.

Radio Warnings of Power Cuts

Use of short-wave radio stations to pass on warnings of impending power cuts is promised by the S.W. Scotland Electricity Board. Four stations are planned at Paisley, Greenock, Yoker and Dumbarton, according to Mr. D. Ross, manager of the Clyde Sub-Area. If equipment can be obtained in time the short-wave stations will be in use at the start of the winter. The Area is also introducing two-way radio contact between the twelve service vans in use and the main headquarters to allow continuous contact between servicemen and office.

Electricity in the Midlands

Alderman W. S. Lewis, chairman of the Midlands Electricity Board, addressing Smethwick Trades Council on 27th July, said that electricity consumption in the Midlands increased by 15 per cent during April, May and June compared with the corresponding period of last year and new consumers were being supplied at the rate of 40,000 a year. The new electricity tariffs, he said, would mean that on the average domestic power would cost less in Smethwick than it did in 1936.

During July the industrial load had fallen off which, he believed, was due to the shortage of raw materials. The position was so fine that if there was 5 per cent unemployment, load shedding would go overnight. After the meeting Alderman Lewis told the *Birmingham Post* that if the 15 per cent increase continued into the winter it could be met if domestic consumers avoided the peak periods. If the public co-operated there would be no load shedding.

Proposed 275 kV Overhead Line

Formal application has been made by the British Electricity Authority to the Ministry of Fuel and Power for "deemed planning permission" to erect a 275 kV overhead line on 110ft towers from Stella, near Newcastle-upon-Tyne, to Carlisle. The greater part of the route lies a mile or two south of the Roman Wall. The Northumberland County Council, which is the planning authority for most of the route, is lodging an objection and a request for a hearing. The B.E.A. has met the objections of the Cumberland Planning Committee by consenting to a southerly diversion over the flatter western part of the route.

Southern Area Tariffs

By seven votes to six the Southern Electricity Consultative Council, at its meeting at Reading last week, approved the new standard domestic tariff which the Board proposes to introduce. Alderman E. W. B. Gill, vice-chairman, said he thought that in most repects it was a good tariff, but he considered that the charges for large houses could not be justified. The all-electric prefabricated dwelling required just as much equipment as the big house, which was probably only partially wired. He could not see why consumers in big houses should have to pay for ten extra units at the higher price for every room. A resolution which Alderman Gill moved on this point was, however, defeated. The new tariffs for street lighting were also discussed and a resolution was passed expressing the opinion that such lighting should be provided by the Board at as near as possible to cost.

FINANCIAL SECTION

Company Notes and Stock Exchange Activities

Reports and Dividends

The General Electric Co., Ltd.—In a preliminary statement the company reports an aggregate profit of the group, before United Kingdom and overseas taxation and proportion attributable to minority shareholders, of £5,651,418, for the year ended 31st March last, as compared with £4,471,692 for 1949-50. The consolidated net profit attributable to the holding company, after U.K. and overseas taxation, is £1,978,039 (against £1,709,404). United Kingdom taxation absorbs £3,149,743 (against £2,378,017). The net profit dealt with in the accounts of the holding company is £1,768,953 (£1,498,680). In addition, £403,234 net profit relating to previous years has been brought into the group profit and loss account, of which £325,051 (£110,220) has been dealt with in the accounts of the holding company. It is proposed to pay an ordinary dividend of 10 per cent (unchanged), and to raise the cash bonus from 7½ per cent to 12½ per cent, making 22½ per cent (against 17½ per cent). The annual meeting will be held on 27th September.

The Hackbridge & Hewittic Electric Co., Ltd., held its annual meeting on 25th July, Mr. T. F. Lister (chairman and managing director) presiding. In his circulated statement, the chairman said that the value of business in hand for Canada and the United States was over $800,000, some of which had undoubtedly been received as a direct result of the establishment of their Canadian company.

After referring to the adverse effect upon production throughout the country of power shortages and the need for a larger allocation by the Government of capital for overcoming them, the chairman said that the demand for the group's products both from home and overseas continued to grow, and orders in hand were more than a third greater in volume than they were a year ago. There seemed every prospect that the demand for their transformers, rectifiers and switchgear would utilize the full productive capacity of the group for some years ahead. They had just been awarded an order for delivery over the next five years to the value of nearly £800,000 for glass bulb rectifier equipment for 29 substations for the Southern Region of the British Railways. Output for the first three months of the current year was slightly higher than for the same period of 1950.

At the annual meeting Mr. Lister announced that since his circulated statement was issued, the company had obtained a $600,000 order from the United States for rectifier equipment.

The Sterling Cable Co., Ltd.—The annual meeting was held on 25th July, Mr. J. S. Clark (chairman and managing director) presiding. In his circulated statement the chairman referred to the difficulties being experienced from fluctuations in the price of raw materials and shortages of supplies. With regard to exports, the capital stock of Beam Instruments Corporation, of New York, was acquired to facilitate trading in the dollar area. Agencies had been established in South American countries, with the result that, including United States orders, 50 per cent of their export output was being paid for in U.S. dollars. Their export turnover represented 60 per cent of their output.

Broadcast Relay Service, Ltd.—Presiding at the annual meeting held on 18th July, Mr. J. S. Wills (chairman and managing director) said that the number of subscribers to their rediffusion services at home showed an increase during the year under review, and the area of operation of these services had been extended to include several additional towns in England and Wales. During the latter part of the year they acquired from Ericsson Telephones, Ltd., the burglar alarm system operated by that company in Nottingham. Orders received by their manufacturing subsidiaries had been well maintained. With regard to their overseas services they passed the 100,000 mark in rediffusion subscribers. The network for a wired television system in Montreal had now been erected and would be ready when the C.B.C. television station was opened towards the end of 1952. In Montreal and in Jersey, Channel Islands, they had undertaken experimental transmission of two television programmes on one cable. In April last a wired television service was opened in Margate on a commercial basis. The Postmaster-General had now issued licences for wired television, and they look forward to introducing similar services in other areas as the material position might permit.

Oldham & Son, Ltd., report a consolidated trading profit for the year ended 31st March, 1951, of £298,895, as compared with £231,004 for 1949-50, to which is added income from Oldham & Son Africa, Ltd., of £11,250 and

miscellaneous income of £3,709, making £313,854. After deducting depreciation and other charges there is a net profit, before taxation, of £265,179 (against £210,161). Taxation requires £154,610 and general reserve receives £65,000. It is proposed to pay a final ordinary dividend of 15 per cent (against 10 per cent), making 30 per cent for the year (against 25 per cent). The balance carried forward is £104,935 (£95,423 brought in).

In his statement accompanying the report and accounts, Mr. J. Oldham (chairman) says that demands for their portable mine lighting equipment and electric storage batteries have continued to increase. "Fibrak" separators for American requirements will be supplied from a plant now being set up near Boston, from which large-scale production is timed to commence in the autumn of this year. Oldham & Son Africa, Ltd., and the Société Française des Procédés Oldham, in which they have 50 per cent and 75 per cent interest respectively, have shown satisfactory profits, and the manufacture of storage batteries in India has now commenced by Oldham & Son (India), Ltd.

A. C. Cossor, Ltd.—Lord Burghley (chairman) presided at the annual meeting held on 26th July. In his circulated statement the chairman said that the radio and television division had a successful year. The volume of their television sales approximately equalled that of their radio sales, and were both greatly in excess of the previous year. The instrument department made steady progress, but their marine radar business had a somewhat disappointing year. They had had at all times more orders on their books than they could fulfil, but they had been working on the introduction of a new model, and this had caused delays in their production programme.

Johnson, Matthey & Co., Ltd.—In his speech at the annual meeting held on Monday last, Mr. H. W. P. Matthey (chairman) said that there had recently been completed the largest building project undertaken by the company for many years in the erection and the bringing into full operation of the extension to the platinum treatment works at Brimsdown, at a cost of approximately £800,000. The chief products from the Brimsdown works were refined nickel, refined copper and a platinum group metal concentrate. Owing to the continuing heavy demand for platinum, further large-scale expansions had been decided on at the Rustenburg and Union mines. It was intended that this additional matter should be treated in South Africa, and for this purpose they were joining with Rustenburg Platinum Mines, Ltd., on terms of joint ownership, in the erection of a treatment plant at Rustenburg in the Transvaal. The final refining of the platinum group metals would be carried out in their own works in England. Sales of their products to the engineering industries during the past year were greater in volume than in any previous year. Increases had been most marked in the quantities they had supplied of low temperature silver brazing alloys, of electrical contacts in silver and platinum and their alloys, and of precision drawn base metal tubes and fine wires, mostly for the electrical, electronic and instrument industries. Their output of machined and pressed parts for electrical contacts and allied components now exceeded three million a week.

The Dubilier Condenser Co., Ltd.—The financial results of this company for the year ended 31st March were published in our last week's issue. In his statement accompanying the reports and accounts, Mr. W. H. Goodman (chairman), says that the output increased both in quantity and value. The installation of the specialized plant referred to last year has been completed and during the latter part of the year has been in full production. Much development work has gone into such new fields of capacitor application, as for example that of radio interference suppression both for television and sound broadcasting.

E. K. Cole, Ltd.—On 2nd October next the company will celebrate its 25th anniversary and to mark the event a special brochure has been prepared which contains, in addition to the review by Mr. E. K. Cole (chairman) of the company's activities during the past year, a history of the company with many excellent illustrations of its works and of some of its products.

In his statement Mr. Cole, after referring to the good progress made by the various divisions of the company, says that in overseas countries they have again established a record in sales of domestic radio receivers, communication equipment, electronic products, plastics and heating equipment. In addition, they have continued to supply components, materials and plant to their associated companies in India and Ireland. During the year, also, they have licensed companies in Holland, Belgium and Sweden to manufacture certain of their electronic equipment.

A. H. Hunt, Ltd., propose to increase the authorized capital to £200,000 by creating 375,000 ordinary shares of 4s each, and to raise up to £50,000 by offering certain of these new shares, in the first instance, to shareholders by way of rights.

George Cohen & Co., Ltd., report a group profit (subject to final audit) after all charges, including £223,229 for taxation, of £342,229, as compared with £129,369 for the preceding year. The amount attributable to the holding company is £331,980 (against £128,823). It is proposed to place £64,000 to general reserve

and to write off £21,948, cost of inaugurating a new superannuation scheme. The proposed final ordinary dividend is 15 per cent (12 per cent), making 23 per cent for the year (20 per cent). The balance carried forward is £135,257 (against £6,407 brought in).

Thos. De La Rue & Co., Ltd., report a group trading profit for the year ended 31st March last of £607,424, as compared with £411,450 for the preceding year. Taxation requires £420,648. It is proposed to pay a final dividend of 35 per cent, maintaining the distribution for the year at 50 per cent. The consolidated balance carried forward is £300,995 (against £304,787 brought in).

The Morgan Crucible Co., Ltd., reports a group net profit for the year ended 31st March last, after meeting all charges, including £902,956 for taxation, of £614,020, as compared with £543,748 for 1949-50. A final dividend of 8¾ per cent is proposed, making 12½ per cent (unchanged) for the year.

Electrical Components, Ltd., reports group profits of £53,711 for the year ended 31st March last, as compared with £54,067 for the preceding year. Taxation absorbed £86,665 (against £65,527). It is proposed to pay a final dividend of 12½ per cent, again making 20 per cent less tax for the year.

The Calcutta Tramways Co., Ltd., reports a profit, after meeting all charges, including £122,000 for taxation, of £56,341 for 1950, as compared with £49,037 for 1949. The final dividend is 3½ per cent, again making 6 per cent, tax free, for the year.

Associated Electrical Industries, Ltd.—At meetings held on 27th July, approval was given to resolutions in connection with the proposed conversion of 8 per cent preference stock into 4½ per cent preference stock and the issue of further ordinary and 4½ per cent preference shares.

Radiovisor Parent, Ltd., reports a trading balance for the year ended 31st March last of £11,279, as compared with £5,032 for 1949-50, and a net profit of £10,089 (against £4,170). It is proposed to pay a final dividend of 12½ per cent, making 25 per cent for the year (against nil), and £12,981 is carried forward (against £6,864 brought in).

George Kent, Ltd., report a group profit for the year ended 31st March, after taxation, of £153,870, as compared with £186,537 for the previous year. It is proposed to pay a final dividend of 9½ per cent, making 12½ per cent for the year (against 10 per cent).

The Electric Furnace Co., Ltd., proposes to pay a final dividend of 5½ per cent on both classes of shares to 31st March last, making 10 per cent for the year (against 8 per cent).

The Cables Investment Trust, Ltd., reports a profit for the year to 30th June last, after providing £166,014 for taxation, of £196,777, as compared with £172,506 for the preceding year. The final ordinary dividend is 3 per cent again making 5 per cent for the year.

T. Clarke & Co., Ltd., are paying an unchanged interim dividend of 9 per cent.

Increase of Capital

Burgess Products Co., Ltd.—Increased by £170,000, in 95,000 6 per cent cumulative preference shares of £1 each and 300,000 ordinary shares of 5s each, beyond the registered capital of £30,000. Each of the 25,000 ordinary shares of £1 in the original capital has been sub-divided into four shares of 5s each.

Liquidations

Neon Tube-Lights (Finsbury), Ltd.—Meetings of creditors and members on 12th September, at 487, Green Lanes, Palmers Green, London, N.13, to receive an account of the winding-up by the liquidator, Mr. W. A. J. Smith.

Warrington Electric Cables, Ltd.—Winding up voluntarily. Particulars of claims by 31st August to the liquidator, Mr. C. D. Irving, 7 Rumford Street, Liverpool, 2.

Sherborne Electrical Co., Ltd.—Winding up voluntarily. Liquidator, Mr. E. B. Bate, Carlton Chambers, Baldwin Street, Bristol, 1

Bankruptcies

S. Edmondson, Main Street, Milnthorpe, Westmorland, electrical dealer and contractor, trading as E. & B. Radio.—Trustee, Mr. L. H. Shipton, 31, Lloyd Street, Manchester, 2, appointed 23rd July.

A. Smith and **J. Smith,** formerly carrying on business in co-partnership at 550, Bolton Road, Pendlebury, Lancs, under the style of J. & A. Smith, electrical contractors.—Order made 25th June suspending discharge for six months until 25th December, 1951.

R. T. H. Brimfield, described in the receiving order as carrying on business under the style of Richfield Electrical Components, at 73-78, High Holborn, London, W.C.1, electrical contractor.—Last day for receiving proofs for dividend 31st July. Trustee, Mr. F. H. Langmaid, Bankruptcy Buildings, Carey Street, London, W.C.2, Official Receiver.

J. Henderson, 17, Granville Terrace, Redcar, Yorks, lately carrying on business at 82a, Galgate, Barnard Castle, Durham, electrician.—Last day for receiving proofs for dividend 8th August. Trustee, Mr. R. F. Howe, 4, Bridge Road, Stockton-on-Tees, Official Receiver.

STOCKS and SHARES

STOCK Exchange markets are beginning to settle down after the shock administered by the dividend limitation proposals put forward by the Chancellor of the Exchequer. The immediate effect was a sharp fall throughout the commercial and industrial lists. Very few of the domestic sections escaped the influence of the depression, which indirectly assisted prices in the fixed-interest and gilt-edged securities, causing the latter to exhibit a better tendency than they had been doing of late.

An element of uncertainty must continue to prevail throughout the Stock Exchange markets until, at all events, the autumn session, when the matter comes up for discussion and debate. That something in the nature of dividend limitation would be put forward by the Government had been generally expected, but the shape in which this has come is a surprise.

Limitation and Control

So far as the majority of the companies with shares quoted on the Stock Exchange are concerned, the dividend control proposals will limit ordinary distributions to the average of the gross amounts paid out for the last two accounting periods for which a final dividend has been paid or declared. The datum line is drawn at Friday last week, and the regulation is to be in force for three years. Principles involved in the measure are, of course, already the subject of hot debate. Its arbitrariness means inevitably a great many injustices, which include the special penalization of those companies which have to date observed most strictly the policy of dividend moderation and restraint. In practice, the complications are formidable. Dividend rates are not always the only factor in the calculation. Account must be taken of capital issues, free or for cash, which may have altered the gross amount involved in the dividend.

Dividends Increased

Straightforward cases of those companies which would be affected by dividend control are those where the dividend has been raised, within the past twelve months, on the same amount of capital as was in issue a year previously. These include G.E.C., as mentioned in another note; A.E.I., which raised the 1950 payment to 20 from 15 per cent; English Electric, 15 against 10 per cent; Allen West, 12½ against 10 per cent; Hackbridge & Hewittic, 18 against 15 per cent; Switchgear & Cowans, 22½ against 20 per cent; Siemens, 10 against 7½ per cent; Automatic Telephone, 15 against 12½ per cent; B.I.C., 7½ against 6⅔ per cent; and a fairly long list of others. In these instances, the indicated yield has temporarily and provisionally to be based on the average of the two rates.

Complications

Calculations in connection with dividend control become particularly complicated in such cases as that of Brush Electric, which paid 10 per cent for 1950, as for 1949, but on capital substantially increased by an issue of shares for cash a year ago. Amounts paid in dividends this year, were, as a result, half as large again as the previous figure, and the new regulation would seem to preclude the maintenance of the present rate. These and other obscurities may well be cleared up when the measure comes before Parliament in the autumn. With the political situation in its present unstable condition, there are, of course, chances that it may never be implemented, or may reach the Statute Book in a greatly modified form.

G.E.C. Dividend

The General Electric Co.'s final dividend and preliminary profits declaration for the year ended last March appeared on the same afternoon as did the Chancellor's dividend statement. The latter served to rob the results of some of the attention due to them. They come, nevertheless, well up to expectations, and are above some of those which had previously brought the price of the shares back, from nearly £5, to 90s. On the day of the announcement, they were comparatively steady in the face of the new dividend proposals. G.E.C. is paying a total of 22½ per cent, against the 17½ per cent paid for the previous decade. Presumably, therefore, further payments would be controlled for the present at 20 per cent. Despite an increase in tax provisions to over £3 million, net group profits are £269,000 higher at just under £2 million.

Whitehall Electric Scheme

The prices of Whitehall Electric Investments issues have been marked up sharply since the repayment proposals, the preference from 22s 6d to 24s, and the £1 ordinary from 14s 6d to the same figure. No dividends have been paid on the latter since 1933. Stockholders were advised by the board six weeks ago not to part with their holdings, pending the scheme, which has now appeared. It provides for the repayment of both the preference and the 10 per cent of the ordinary which is held by the public, at a price of 25s; and this method is adopted as being preferable, from the stockholders' point of view, to a liquidation. The balance of the assets remain with the S. Pearson & Son group. Judging from the response in share prices, there will be few dissenting voices at the meeting to be held on 15th August.

Telephone Cables in Denmark

Unusual Type and Method of Jointing

WHAT is described as an "all-plastic" type of carrier-frequency multiquad underground cable is being laid by the Copenhagen Telephone Company as part of a large scheme of expansion of its communications system. Two cables, one for each direction of transmission, have been developed and manufactured by the Telegraph Construction & Maintenance Co., Ltd., at Greenwich. They are insulated and sheathed with "Telcothene"—a tough flexible synthetic thermoplastic based on polythene, which is unaffected by water—and are designed to provide 48 speech channels per pair in a frequency band from 12 to 204 kc/s, making a total of 1,152 circuits for the two 12-quad cables. Further experimental work is in progress regarding the use of carrier type "Telcothene" cables and it seems likely that a target of 60 speech channels per pair will be achieved, or some 1,440 circuits by using two 12-quad cables.

Method of Construction

Conductors of a diameter of 0·040in (25 lb/mile) were chosen instead of the usual 0·050in (40 lb/mile) since the distance necessitates an intermediate repeater in either case. To minimize crosstalk a high degree of balance is required; it is obtained partly by careful manufacture, needed especially for the smaller size, and partly by special balancing when laid. Each copper conductor is insulated by an extrusion of "Telcothene" to a diameter of 0·102in, opposite cores in any one quad being coloured similarly for identification of pairs. Four cores are laid up round a separately extruded cord to form the quads, which are left unfilled so that there are air spaces in the interstices. Different suitable lengths of lay are used for each quad. Twelve quads are laid up, three in an inner layer and nine in an outer layer, then bound together with a thin "Telcothene" tape. Over this is extruded a tubular sheath of 0·065in radial thickness of the same material, which is applied sufficiently tightly to lock the quads lightly into position, thus ensuring during subsequent processing and laying the stability essential to a high-grade balance. A screen of thin copper tapes is lapped over the sheath and protected by alternate layers of compound and bitumenized paper tape.

For laying in trench, the cable is served with compounded jute, armoured with two steel tapes each 0·030in thick, and finished with two compounded hessian tapes. The overall diameter is approximately 1·63in and the weight 4 tons/mile. For drawing into ducts, the cable is finished with an outer sheath of polyvinyl chloride of 0·10in radial thickness, extruded directly over the copper tape screen; in this case the overall diameter is approximately 1·35in and the weight 2·2 tons/mile.

The dielectric constant of "Telcothene" being 2·3, the capacitance and low-frequency attenuation of these cables are greater than for the normal paper insulated type. But, owing to the low power factor, the attenuation rises more slowly with frequency so that at 200 kc/s it is no greater than for paper insulated cable with the same size conductors. For 60 db attenuation, maximum repeater spacing with 25 lb conductors is about 12 miles for 48-channel working; with 40 lb conductors it is about 16 miles for 48-channel working, or 14 miles for 60-channel working. Due to the almost negligible losses in the dielectric at high frequencies, it may become possible as development proceeds to operate a larger number of communication channels per pair of wires than is the case with any other known cable.

Installation Facilitated

The light weight of the cable, due to the absence of a lead sheath, makes installation very easy. Two lengths of 250 metres were pulled into the trench in half an hour, the maximum tension being only about 400 lb, a fraction of what the cable will stand without harm. This means that it can be laid in about one-fifth of the time it would take to lay lead covered paper insulated cable of the same size under similar conditions, thus reducing considerably the cost of installation.

A method of jointing by injection moulding has been developed that is suitable for use on site, the heat required being furnished electrically by a 2 kW petrol-driven generator. Conductors are butt brazed in a small electric welder, using fluxless solder, after which the insulation joint is made in each quad as a whole. A quad is placed in a small mould, which is then heated internally by warm gas. Meanwhile a " Telcothene " charge has been heated in an injector. When correct temperatures have been attained, the injector is placed over the injection hole of the mould and its piston is released. While " Telcothene " emerges from the spew holes, a stream of cold air is played on the mould to hasten cooling; the mould is then opened and the completed quad joint removed.

All quads having been jointed and laid into position, a " Telcothene " tube (previously slipped over the cable sheath) is slid back into place. In a similar way, with a ring mould, the tube is welded to the sheath on each side of the joint after which the screen, armour, etc., are replaced and made good. Joints can be blocked by injecting a special compound into the " Telcothene " tube.

Fault liability with these cables is small and, should major mechanical damage puncture the sheath without damaging the insulated conductors, circuit continuity will be maintained, although the ingress of water would inevitably reduce carrier-frequency facilities until a repair is effected. Wet cable can be dried in the usual manner by the passage of dry gas. In order to detect and locate sheath faults, bare copper wires have been included in the cable: they are available for an insulation guard circuit operating an automatic alarm.

The cables have been designed to permit, if desired, the feeding of power through them to energize intermediate repeater stations. Equipment is being supplied by Philips' Telecommunication Industries, of Holland.

Lamps for Blue-Printing Machines

IT has been recognized for some time that a high-wattage mercury lamp with a quartz inner envelope would be advantageous for blue-printing machines, because quartz transmits 100 per cent of the effective ultra-violet radiations. Hitherto it has been the general practice to use 400 W lamps, which have a hard glass inner and soft glass outer. Quartz inners are used in the 80 W and 125 W mercury lamps, but these are of too low a wattage for blue-printing requirements. The 3 kW lamp with quartz inner has been used to some extent, but questions of cost preclude its being equipped with a vacuum jacket. A current of cold air on the loosely fitting outer jacket of this lamp can cause a serious fall in lamp watts, with detrimental effect on the electrodes and lamp life as well as loss of printing speed. Special arrangements of ducts and fans are necessary to overcome this difficulty, and the gain in printing speed of about 20 per cent is not high in relation to the increased costs.

The introduction of the " Osram " 1 kW mercury lamp has met some of the blue-printing requirements which, as shown above, were only partly fulfilled by previous mercury lamp sizes. The 1 kW lamp has a quartz inner and clear soft glass outer. Four of these lamps are used in the " Victory " three-phase copier made by Precision Photo Printing Plant, Ltd. The lamps have been found to give an increase of 80 to 100 per cent in printing speed compared with the previous standard arrangement of nine 400 W lamps. This confirms the marked improvement in u.v. emission arising from the use of quartz for the inner envelope. The lamp has the same arc length as the 400 W one and almost the same overall length, being housed in an outer jacket of the same shape as the 400 W isothermal mercury fluorescent lamp.

The four lamps in this particular machine are arranged to reciprocate so as to provide uniform exposure over the whole width of the paper as it is carried round the glass cylinder. A voltage of 400 or above is necessary for operating the lamp in its present form, but in most establishments using blue-printing machines a three-phase supply from which such a voltage is obtainable will almost always be available.

B.I.C.C. " Open " Weeks

THE opening of its Prescot and Melling factories last year to visitors was so successful that British Insulated Callender's Cables, Ltd., has this year extended the scope to embrace other factories. In consequence, Helsby works, Cheshire, recently entertained 800 visitors. Prescot, Lancs, has received 1,500, and during the present week large numbers are visiting the Anchor works at Leigh, Lancs. By far the major proportion of response has come from families of employees, and local business men.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies o any specification (2s each) may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.

1945

4123. Comptoir des Cendres et Metaux Precieux, and Klein, S.—Thermionic emitting device. 1st March, 1945. (657032.)

4125. Comptoir des Cendres et Metaux Precieux, and Klein, S.—Apparatus for measuring gaseous pressure. 1st March, 1945. (657033.)

1946

2775. Compagnie Electro-Mecanique.—Electric telemeasurement apparatus. 28th January, 1946. (657031.)

9269. Babat, G. I.—High-frequency electric transport system with contactless transmission of energy. 26th March, 1946. (657035.)

9270. Babat, G. I.—Overhead and underground traction power supply systems for high-frequency electrified transport with contactless energy transfer. 26th March, 1946. (657036.)

11976. Naamlooze Vennootschap Philips' Gloeilampenfabrieken.—Dry-shaving apparatus. 17th May, 1946. (657037.) Also 23427, 7th August, 1946. (657041.)

31407. Philips Lamps, Ltd.—Circuit for the production of direct voltages. 20th November, 1946. (Addition to 640610.) (657042.)

1947

2182. Sperry Gyroscope Co., Ltd., and Hansford, R. F.—Cathode-ray tube display systems. 26th February, 1948. (657047.)

11318. Radio-Industrie.—Scanning directional aerials. 29th May, 1947. (657049.)

15222. Compagnie Générale de Télégraphie sans Fil.—Magnetrons. 10th June, 1947. (657050.)

19339. British Thomson-Houston Co., Ltd., and Shurmer, H. V.—Mathematical calculators. 18th July, 1947. (657051.)

20134. Western Electric Co., Inc.—Cathode-ray tubes and signalling systems incorporating such tubes. 25th July, 1947. (657053.) Also 20991. 1st August, 1947. (657054.)

29982. Allen West & Co., Ltd., and Johnson, C.—Means for controlling a series of electrical contacts. 10th November, 1948. (657092.)

30005. Radio Corporation of America.—Electron-tube containing a plurality of aligned wound grids. 11th November, 1947. (657093.)

30956. Automatic Electric Laboratories, Inc.—Voice current repeater. 21st November, 1947. (657094.)

33910. Poole, R. B.—Colour television system. 27th May, 1948. (657060.)

33945. Igranic Electric Co., Ltd.—Electric control systems. 23rd December, 1947. (657096.)

1948

7908. Metropolitan-Vickers Electrical Co., and Hill, E. P.—Commutating dynamo-electric machines. 27th January, 1949. (657105.)

9019. Poole, R. P.—Colour television and kinematographic picture projection systems. 3rd March, 1949. (Cognate application 33575, 31st December, 1948.) (657062.)

20063. El-Said, M. A. H.—Electrical mixing circuit arrangements. 9th April, 1948. (657109.)

12151. Automatic Telephone & Electric Co., Ltd., Davison, A., and Baker, G. T.—Relaxation circuits. 30th April, 1949. (657063.)

18204. McGee, J. D.—Electron-discharge devices employing charge storage target electrodes. 7th July, 1949. (657116.)

20772. Westinghouse Electric International Co.—Control systems for dynamo-electric machines. 6th August, 1948. (657118.)

20976. Kalart Co., Inc.—Electric photoflash arrangements. 9th August, 1948. (657119.)

21980. Standard Telephones & Cables, Ltd.—Remote fault indicating system for multichannel pulse modulation radio link. 20th August, 1948. (657120.)

22378/9. Naamlooze Vennootschap Philips' Gloeilampenfabrieken.—Methods of brazing articles consisting of oxidation-resistant alloys. 25th August, 1948. (657122/3.)

22400. Metropolitan-Vickers Electrical Co., Ltd., and Wood, L.—Amplifiers for recording apparatus. 23rd August, 1949. (657124.)

24708. Soc. de Condensation et d'Applications Mecaniques, Florisson, C. L., and Dubrulle, L.—Supersonic apparatus utilizing a piezo-electric device. 21st September, 1948. (657127.)

25388. Modinstal Electric Co., Ltd., and Malins, E. C.—Infra-red heat generators. 27th September, 1949. (657128.)

25634. British Thomson-Houston Co., Ltd.—Snap-action electric switches. 1st October, 1948. (657130.)

25927. Automatic Telephone & Electric Co., Ltd., Davison, A., and Pearce, J. G.—Telephone systems. 21st September, 1949. (657069.)

25942. Naamlooze Vennootschap Philips' Gloeilampenfabrieken.—Circuits for counting electrical pulses. 5th October, 1948. (657132.)

26727. English Electric Co., Ltd., Woodford, C. G. A., and Bostock, J.—Electric remote control systems. 14th October, 1949. (657070.)

26835. Veaux, H. M.—System for connecting a radio station to a telephone network utilizing the same frequency band for the two directions of transmission. 15th October, 1948. (657134.)

26882. Wheeler, L. K., and Frost, A. C.—Electronic regenerative repeaters for start-stop telegraph systems. 15th October, 1948. (657071.)

27823. General Electric Co., Ltd., and Williams, C. E.—Electric circuit arrangements for operating electric discharge lamps on a.c. 20th October, 1949. (657072.)

27824. General Electric Co., Ltd., and Williams, C. E.—Electric circuit arrangements for operating electric discharge lamps. 26th October, 1949. (657073.)

28877. Warren, R. H.—Glass envelopes, especially for cathode-ray tubes. 5th November, 1949. (657270.)

28973. Masciarelli, C.—Systems for operating electric discharge tubes. 8th November, 1948. (657135.)

29305/6. Automatic Telephone & Electric Co., Ltd., and Taylor, R.—Automatic switches as used in telephone systems. 9th November, 1949. (657076/7.)

29533. Nemec, H.—Electro-medical apparatus. 13th November, 1948. (657138.)

30006. Ehrenberg, W., and Spear, W. E.—X-ray tubes. 9th May, 1949. (657140.)

30971. A. C. Cossor, Ltd., and Covill, D. H.—Voltage stabilizing apparatus. 3rd November, 1949. (657141.)

31019. Soc. Anon. A. Citroen.—Toroidal transformers for intermittent operation. 30th November, 1948. (657142.)

32016. British Thomson-Houston Co., Ltd.—Magnetic sound recording mediums. 10th December, 1948. (657145.)

1949

1086. Western Electric Co., Inc.—Electric pulse code group decoding systems. 14th January, 1949. (657251.)

1228. Superstat, Ltd., Brake, A. H., and Osborne, S. C.—Electronic treatment of water for the purpose of reducing the effects due to hardness. 16th January, 1950. (Addition to 606154.) (657150.)

1269. British Thomson-Houston Co., Ltd.—Methods of preparing alkylfluorosilanes. 17th January, 1949. (657152.)

1606. Etablissements Merlin & Gerin.—Cooling arrangements for electrical resistances. 20th January, 1949. (657084.)

1753. British Thomson-Houston Co., Ltd.—Electrical oil immersed circuit-breakers. 11th January, 1950. (657255.)

2152. Telemecanique Electrique. — Electromagnetic actuator for contactors and like switches. 26th January, 1949. (657164.)

2400. G. & J. Weir, Ltd., and Hillier, H.—Boiler feed systems. 28th January, 1949. (657191.)

2423. Sperry Gyroscope Co., Ltd., Dove, F., and Luttrelle, W. F.—Circuit arrangements for indicating operational faults in polyphase alternating current supply circuits. 16th January, 1950. (657260.)

2516. D.S. Plugs, Ltd., and Lund, J.—Electric tumbler switches. 19th November, 1949. (657263.)

2520. Stevenson, B.—Cartons for holding electric lamps. 31st December, 1949. (657198.)

2677. National Research Development Corporation.—Pulse peak voltmeter circuit. 31st January, 1950. (657267.)

2750. New Jersey Zinc Co.—Zinc condensers. 1st February, 1949. (657205.)

2805. G. & J. Weir, Ltd., and Hillier, H.—Closed feed systems for boilers. 2nd February, 1949. (657170.)

2854. Westinghouse Electric International Co.—Direct current generators. 2nd February, 1949. (657172.)

2878. British Thomson-Houston Co., Ltd.—Electric ranges. 2nd February, 1949. (657175.)

3005. British Thomson-Houston Co., Ltd., and Scott, W. J.—Glass-to-metal seals. 27th January, 1950. (657271.)

3006. British Thomson-Houston Co., Ltd.—Phase and frequency modulation systems. 3rd February, 1949. (657272.)

3050. Striker, G. O.—Instruments for the measuring of ionization currents. 3rd February, 1949. (657277.)

3809. Westinghouse Electric International Co.—Fuel supply systems for combustion apparatus. 11th February, 1949. (657213.)

4381. British Thomson-Houston Co., Ltd.—Electric incandescent lamps. 17th February, 1949. (657220.)

4691. Westinghouse Electric International Co.—Axial-flow fans. 21st February, 1949. (657225.)

4800. General Electric Co., Ltd., Halliday, V. N., and Ralph, F. E.—Electrical measuring devices. 24th November, 1949. (657229.)

5073. Electro Acoustic Industries, Ltd., and Barden, G. A.—Focusing and positioning of the beam of a cathode-ray tube. 17th June, 1949. (657234.)

5422. Hazeltine Corporation. — Super-regenerative amplifier. 28th February, 1949. (657239.)

5440. Telegraph Construction & Maintenance Co., Ltd.—Joints for electrical cables. 16th February, 1950. (657240.)

5464. Kresse, A., and Wuck, K. (trading as Kresse, Schneider & Co.)—Electrically-heated devices. 28th February, 1949. (657241.)

5713. Philips Electrical, Ltd.—Electric incandescent lamps. 2nd March, 1949. (657243.)

6160. Metropolitan-Vickers Electrical Co., Ltd.—Induction heating apparatus. 7th March, 1949. (657246.)

6290. British Thomson-Houston Co., Ltd.—Moulds for casting metals. 8th March, 1949. (657248.)

1950

25951. Automatic Telephone & Electric Co., Ltd., Davison, A., and Baker, G. T.—Relaxation circuits. 30th April, 1949. (Divided out of 657063.) (657089.)

CANADIAN ELECTRICAL MANUFACTURE

PRODUCTION by Canadian firms in the electrical apparatus and supplies industry in 1949 was valued at $486,286,000, an increase of nearly 15 per cent on 1948. The principal items, with corresponding figures for 1948, are shown in the accompanying table; some of the totals include goods made by firms not solely engaged in electrical manufacture.

In 1949, a.c. generators of 1,001 kVA and above to the number of 28 were made of a total rating of 540,670 kVA and selling value at works of $6,787,077. In motor manufacture nearly one-third the total value consisted of single-phase induction machines of ½ h.p. or under. In the important wires and cables group an increase of nearly 25 per cent was shown in aluminium conductors and there was also a big advance in p.i. telephone cable.

Class of Goods	1948 $ (000)	1949 $ (000)	Class of Goods	1948 $ (000)	1949 $ (000)
Generators, a.c.	6,331	7,224	Transformers and parts	30,376	35,525
Generators, d.c.	274	242	Telephone material	31,888	32,531
Convertor equipment	4,661	1,720	Vacuum cleaners and parts	6,827	8,112
Lamps, standard sizes	7,547	7,823	Stoves over 35 A	14,879	18,667
Lamps, miniature	1,951	2,253	Rangettes	1,227	2,269
Lamps, fluorescent	2,423	3,383	Grills, etc.	1,243	1,184
Lighting fixtures	15,734	1,4999	Electric flat irons	2,468	2,326
Washing machines, electric	27,573	27,958	Electric toasters	1,597	2,481
Furnaces	690	403	Water heaters	712	1,367
Watt-hour meters	5,895	7,205	Switchgear and protective equipment	21,300	26,974
Wires and cables	85,603	85,785	Wiring devices	10,781	12,415
Motors and parts	29,086	29,114	Welding apparatus	2,727	2,718
Industrial control equipment	7,653	8,072	Apparatus and parts not elsewhere specified	25,018	33,566
Radio receiving sets	25,441	31,426			
Radio valves	1,831	2,787			
Refrigerators, electric	38,305	53,409			

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

CONTRACTS OPEN

Where "Contracts Open" are advertised in our "Official Notices" section, the date of the issue is given in parentheses.

Bath.—18th August. City Council. Street lighting fittings. (See this issue.)

Egypt.—CAIRO.—18th September. Director General, Cairo Electricity & Gas Administration. Supply of 111 km of 2- and 3-core power cable. (See this issue.)

Newcastle-on-Tyne.—17th August. City Transport and Electricity Undertaking. Equipment for Slatyford Lane Depot, including electricity supply and overhead line equipment. (See this issue.)

New Zealand.—WELLINGTON.—6th November. State Hydro-Electric Department. Supply and delivery of 11 kV switchgear. (C.R.E. (I.B.) 66664/51. Ten/2733.)*

Tettenhall.—22nd August. U.D.C. Street lighting equipment. (See this issue.)

Uruguay. — MONTEVIDEO. — 20th August. Direccion General de Communicaciones. Automatic telegraphic apparatus. (C.R.E. (I.B.) 66475/51. Ten/2728.)*

Wolverhampton.—27th August. Corporation. Street lighting improvement scheme. (See this issue.)

ORDERS PLACED

Barnard Castle.—R.D.C. Installation of electric lighting in 250 wash-houses on Council estates.—Swaledale Radio & Electrical Co.

Manchester.—Corporation. Electrical installation work: Didsbury Training College and 233 houses at Northern Moor, Wythenshawe.—A. E. Sudlow & Co., Ltd. Newall Green Secondary School.—Electrical Equipment Co. (Leicester), Ltd. Oldwood Primary School.—Hartley Electromotives, Ltd. Lancastrian Special School.—Albert Loudon. Houses (117) at Crossacres Road, Mendip Avenue and Woodhouse Park, Wythenshawe.—H. C. Taylor & Co., Ltd.

Newcastle-on-Tyne.—City Council. Installation of electricity in place of gas in Council houses (£5,295).—Bernard Berrie.

Newcastle-under-Lyme.—Highways Committee. Street lighting schemes on Trunk Road A.34, and in Bradwell Lane (£10,310).—British Thomson-Houston Co., Ltd.

*Specifications may be inspected at the Commercial Relations and Exports Department, Board of Trade, Thames House North, Millbank, S.W.1 (Victoria 9040).

CONTRACTS IN PROSPECT

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Bath.—Junior school, Charmouth Road; H. H. Goldsmith, architect, 18, Gay Street.

Berkshire.—Secondary mixed school, Wokingham; Gilbert Ash, Ltd., builders, 2, Stanhope Gate, W.1.

Bexhill - on - Sea.—Convalescent home; Hearts of Oak Benefit Society, Euston Road, N.W.1.

Billingham-on-Tees.—Houses (96), Roseberry Road; Kitching & Co., U.D.C. architects, 21, Albert Road, Middlesbrough.

Birmingham.—Houses, Wychall Farm, Kings Norton (240), Church Road, Northfield (96) and Hawkesley Crescent, Turves Green (22); S. J. Smith (Bidford), Ltd., builders, Smith Road, Wednesbury.

Bolton.—Extensions for Harry Mason & Co., Ltd.; Wm. Gornall & Sons, Ltd., Ellesmere Street, Bolton.

Bootle.—Houses (98), Sterrix Lane site; Lloyd & Cross, Ltd., 68, Argyle Street, Birkenhead.

Bradford.—Garage for 70 vehicles, Hammerton Street depot; city architect.

Bridgend.—Houses (80), West House site; U.D.C. surveyor.

Brighton.—Dwellings (75), North Brighton estate; James Miller & Partners, Ltd., builders, 7, Suffolk Street, S.W.1.

Bristol.—College of art, commerce and technology, Muller's Orphanage site; W. J. Stenner, architect, 29, Berkeley Square.

Bucks.—Infants' school, Old Bradwell, during 1951/2 (£18,480) and adaptation of Bletchley Park Training College to increase accommodation (£27,500); county architect, Aylesbury.

Burnley.—Hargher Clough day nursery; Samuel Taylor, Son & Platt, architects, 60, Manchester Road, Burnley.

Bury St. Edmunds.—Houses (56), Derwent Road; borough surveyor.

Buxton.—Factory at Ashbourne Road for Brake Linings, Ltd.; Wood, Goldstraw & Yorath, architects, Victoria Chambers, Station Road, Tunstall, Stoke-on-Trent.

Caistor.—New block at Institution (£24,149); H. Ashton & Son, Newport Street, Barton-on-Humber, Lincs.

Chapel-en-le-Frith.—Houses, Cote Lane estate, Hayfield (20) and Long Lane estate, Charlesworth (17) for R.D.C.; Vessey Bros. (Contractors), Ltd., Marple, Cheshire.

Chester.—Works extensions; De Havilland Aircraft Co. Ltd., Broughton Works.

Coventry.—Proposed old people's home, Broad Lane; city architect.

Houses for T.C.: Bell Green neighbourhood unit (25); Coltman & Sons, 57, Castle Street, Coventry. Proflitt Avenue (24); G. W. Deeley, 27, Avon Street, Upper Stoke.

Darlington.—Mill additions; Darlington and Simpson Rolling Mills, Ltd.

Doncaster.—Students' residential block at High Melton Training College; education architect, Whitaker Street.

Ealing.—New wing at old people's home, Castlebar Road; Alan W. Pipe & Sons, architects, 8, Queen Street, E.C.4.

Edmonton.—Rebuilding part of factory; Regent Tyre & Rubber Co., Ltd., Pretoria Road.

Grimsby.—Conversion of "Farnhurst," Eleanor Street, into home for old people (£17,433); borough architect.

Harlow.—Factory; Mentmore Manufacturing Co., Ltd., Platignum House, Tudor Grove, E.9.

Hebburn-on-Tyne.—Houses (102) for people displaced under clearance schemes, and 36 houses on Hartleyburn site; R. C. Bestow, surveyor.

Leek.—Fifty "Cornish Unit" houses for U.D.C.; Selleck, Nicholls & Co., Ltd., St. Austell, Cornwall.

Lincoln.—Flats and maisonnettes (42), Henley Street; city architect.

Liverpool.—Factory on 50-acre site, Kirkby estate, East Lancashire Road; Standard Motor Co., Ltd., Coventry.

London.—Woolwich.—Dwellings (122), Coldharbour estate; borough engineer.

Malvern.—Houses (98), Worcester Road, for U.D.C.; M. Wilesmith & Son, Malvern.

Manchester.—New premises at Market Street for Wm. Timpson, Ltd.; Architect's Department, Emperic House, Great Ducie Street, Manchester.

Day nursery, Wythenshawe (£19,000); city architect.

Margate.—Houses (92), Cambourne Avenue estate; W. L. Armstrong, borough surveyor, 38, Grosvenor Place.

Market Drayton.—Houses (28), Dalelands estate, for U.D.C.; J. A. Harvey, Ltd., Market Drayton.

Middleton.—Houses (140) for key workers; borough surveyor.

Newcastle - on - Tyne.—Extensions to central police station, new section station and four police houses (£14,600); city architect, 18, Cloth Market, Newcastle.

Houses (64) and seven pairs of flats; city architect.

Nurses' home, Claremont Place, for United Newcastle Hospitals, Royal Victoria Infirmary, Newcastle.

North Riding.—Police houses (26); county architect, County Hall, Northallerton.

Peterborough.—Houses (78), Eastfield estate; C. W. Shelton, Ltd., Peterborough.

Houses (54), Mountsteven Avenue estate; city engineer.

Petersfield.—Secondary school, The Causeway (£137,000); county architect, The Castle, Winchester.

Plymouth.—Four-storey building, Tresillian Street; Clarke, Doble and Brendon, printers, Paper Works, Oakfield Road.

Rawtenstall.—Houses (20), Staghills estate; borough engineer.

Reading.—Extensions to Old National Schools, Tilehurst; A. I. Cripps, architect, 18, Caversham Road.

Houses (186), Bath Road; J. T. Cook & Sons, Ltd., builders, 11, Holmes Road.

Rugby.—Two blocks of three-storey flats, and 10 bungalows, Deepmore Road, Overslade estate; borough surveyor, Burford House, Church Walk.

Salisbury.—Abattoir, Ashley Road; Ministry of Food.

Scarborough.—Additions to Scarborough College; Baker and Clark, architects, York Place.

Smethwick.—Rebuilding of works; Mansill, Booth & Co., Ltd., Cape Stamping Works.

Southport.—Houses (80), Heathfield Road; borough architect.

Staffordshire.—County primary schools, Brickhouse Farm, Rowley Regis and Wheel Lane, Lichfield, extensions to Cannock County Mining College, and adaptations at Rangemore Hall, Burton-on-Trent, for Needwood Special school; A. C. H. Stillman, Green Hall, Lichfield Road, Stafford.

Stockton-on-Tees.—Works additions, William Street, for Planet Refrigeration, Ltd.; R. Cowan, architect, Finkle Street, Stockton.

Suffolk.—Infants' school at Kirkley (£42,000); East Suffolk county architect, County Hall, Ipswich.

Swansea.—Central works depot, Cave Street; borough architect.

Tottenham. Flats (78), Factory Lane and Burbridge Way, N.17; borough surveyor, Town Hall, N.15.

Uckfield.—Flats and houses (52), Church Street site; D. C. Durrant, clerk, Beacon Road, Crowborough, Sussex.

Wakefield.—Mill extensions; W. Wade & Sons, Ltd., Portobello Mills.

Rebuilding departmental stores, Kirkgate; F. W. Woolworth & Co., Ltd.

Wellingborough.—Health clinic; county architect, Northampton.

West Riding.—Technical school and county college, Todmorden, and county primary school, Delph, Saddleworth; county architect, Bishopgarth, Westfield Road, Wakefield.

Windsor.—Dwellings (60), Straight Road, for R.D.C.; Sainsbury and Chamberlain, architects, 14, Cross Street, Reading.